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# historic structure report
## architectural data section
## phase II: exterior preservation

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# JEFFERSON NATIONAL EXPANSION MEMORIAL
## OLD COURTHOUSE

NATIONAL HISTORIC SITE / MISSOURI

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# HISTORIC STRUCTURE REPORT
## Architectural Data Section
## Phase II: Exterior Preservation

# OLD COURTHOUSE
## JEFFERSON NATIONAL EXPANSION MEMORIAL NATIONAL HISTORIC SITE
## Missouri

by
David G. Henderson

September 1985

U.S. Department of the Interior / National Park Service

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# PREFACE

This document is the second in a series of historic structure reports, architectural data sections, on the old courthouse at Jefferson National Expansion Memorial National Historic Site and is designated "Phase II: Exterior Preservation." The first report, by Curtis Lester, was distributed in March 1977 and is designated "Phase I: Water Intrusions - Wing Roofs." A third report, "Phase III: Interior Preservation and Adaptive Restoration," will cover architectural, decorative, mechanical, and electrical elements of the building's interior.

It is recommended that a final report in this series be programmed. Designated "Phase IV: Historic Landscape Preservation," the report would deal generally with early grounds features and specifically with drainage, areaways, steps, and retaining walls, which are not covered in this phase II report. In addition, it could consider vanished exterior historic elements of the building such as downspouts and awnings.

A "Historic Structure Report, Historical Data Section - Part 1/Historic Grounds Study," by John H. Lindenbusch, was published in 1982. It provides an account of the historic landscape as well as general information on additions and changes to the exterior of the building. However, the majority of the report records in detail the interior structural and architectural evolution of the courthouse. The author recommends a part 2 report to preserve the interesting judicial, social, and political history associated with the old courthouse.

An "Administrative Data Section" prepared by Robert Chandler, former superintendent, serves all the above reports.

Regarding the exterior downspouts mentioned above, it should be noted that a construction contract completed in 1979 for repairing the wing roofs and drainage systems included repair and modification of the existing interior downspouts, not reproduction of the historic exterior downspouts. Possible restoration of these vanished downspouts will be discussed in a later report.

In the phase I report, the term "terneplate" used to describe the roofing of the 1941 wing gable roof replacement is incorrect; the roofing is actually lead-coated copper. Terneplate consists of sheet steel coated with an alloy of 80 percent lead and 20 percent tin.

The patient, unstinting help given to the investigators by Superintendents Chandler and Schober and their staff is much appreciated. In addition, this report has been made possible by important contributions from the following persons, and the author thanks them all:

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Erik Anderson, engineering technician

University of Notre Dame

Dr. Erhard M. Winkler, Professor of Geology and Engineering Geologist, an authority on building stone and its deterioration

Washington University

Phoebe Dent Weil, conservator and research associate, Center for Archaeometry, a specialist in conservation of bronze and copper

The writer wishes to commend the park maintenance staff, who under the direction of Robert Kelly, facility manager, has done a great deal of work in preserving the old courthouse for over five years. Much of this work has been of an emergency nature, and was accomplished under pressure with limited funds and under very difficult and dangerous conditions. In particular, the work included filling cracks, fissures, and enlarged joints with special compounds at critical areas of the lower wall cornices and parapets, sloping pediments, and the ledge and cornice below and above the upper drum. This vital work has had a substantial effect in protecting the building.

# ADMINISTRATIVE DATA

## PROJECT IDENTIFICATION: BUILDING NAME, NUMBER, SPECIFIC LOCATION IN PARK, AND DATE OR PERIOD OF HISTORICAL OR CULTURAL SIGNIFICANCE

Name: Old Courthouse. This structure, now occupied by area headquarters, was built in sections beginning in 1839 and was completed in 1862.

Building Number: 1

Specific Location: The courthouse is in downtown St. Louis facing the Mississippi River, and is bounded by Broadway on the west, Market Street on the south, Chestnut Street on the north, and Fourth Street on the east. The courthouse is at the west boundary of the Jefferson National Expansion Memorial National Historic Site, and its address is 11 North Fourth Street, St. Louis, Missouri, zone 15, easting 744,700, northing 4,278,950.

## PROPOSED LEVEL OF TREATMENT

The park is listed in the National Register of Historic Places. The old courthouse is a nationally significant category 1a structure. The recommended level of treatment is exterior preservation and interior restoration/adaptive restoration.

## PROPOSED DEVELOPMENT WORK

It is proposed that a thorough architectural survey and analysis of the building be made and that preservation and adaptive restoration be carried out as soon as funds are available.

## PROPOSED USE OF STRUCTURE

The building will house the administrative offices of the national historic site and will contain living history exhibits, an exhibit on St. Louis, and other displays that are supplemental to, and supportive of, the Museum of Westward Expansion.

## COOPERATIVE AGREEMENTS

There are no cooperative agreements in effect.

# INTRODUCTION

## SIGNIFICANCE

The suits brought by the Negro slave Dred Scott in 1847 and 1850 to gain his freedom are the historical events most prominently associated with the old courthouse, leading as they ultimately did to bitter national division and civil war. Actually, the significance of the building began much earlier with the basic reality of the ground on which the structure was erected.

In 1764, 39 years before the Louisiana Purchase, Pierre Laclede founded the village of St. Louis; in his party was a 13-year-old boy named Auguste Chouteau. In 1823, Chouteau, by then considered a founding father of the city, and Judge John B.C. Lucas (one of the first officials appointed by President Jefferson to administer the new Louisiana Territory) donated, as a public square, land from what had originally been part of St. Louis's common field at the western edge of the village. The city was incorporated the same year and the square approved as the courthouse site.

From the beginning the courthouse was the focal point of the community and was used as a public forum as well as a courthouse. It became the symbolic center of the city, which in a very real sense was the gateway to westward expansion. This importance is dramatically reinforced today by the towering Gateway Arch, the east-west axis of which is aligned precisely with the present old courthouse axis.

Of major significance in the fields of architecture and engineering is the courthouse dome, especially its wrought-iron structural frame, which was unique in the United States and possibly in the world when completed in 1861. Much lighter than cast iron, the dome became the prototype for numerous state capitol domes and predated the final dome (cast iron) of the U.S. Capitol by 1½ years. On June 17, 1862, a patent for the dome was issued to William Rumbold, architect for the courthouse from 1859 to 1867. The 190-foot height of the courthouse made it the dominant visual element in the cityscape until larger office buildings began to appear ca. 1900. The building and square were frequently the scene of public activities until late in the century. Together the rotunda, galleries, and roomy corridors provided an impressive and commodious space, one of the largest in St. Louis. Countless mass meetings and ceremonies relating to the Mexican War, the bitter controversy of slavery, the Civil War, and other major issues took place within its walls. Perhaps the greatest role of the courthouse on a regional scale was as the site of a railroad convention in 1849, the high point of public fervor for a rail line from St. Louis to the Pacific.

The courthouse grounds were used for overflow crowds from the public meetings inside and frequently for auctions, demonstrations, and other events.

By the 1880s other large rooms in other structures were available for public gatherings, and the courthouse was used less. One of the last important assemblies was the reception for President Cleveland in 1887.

The old courthouse is included within Jefferson National Expansion Memorial, which was designated by Executive Order 7253 of December 21, 1935. As a national historic site, the park is listed on the National Register of Historic Places, and the old courthouse is a nationally significant category 1a structure.

## HISTORICAL BACKGROUND

Pressures resulting from the 300 percent increase in St. Louis's population from 1828 to 1838 made it necessary to replace the original 1828 courthouse with a new building. The 1828 courthouse was a two-story brick structure in the Federal style with a curved Ionic portico and a lantern, or cupola. Described as the most elegant building in Missouri at that time, the structure was designed by Laveill and Morton who were also the architects for the historic limestone cathedral built during 1831-34, which still stands a short distance southeast of the old courthouse.

On September 7, 1838, an architectural contest was announced for plans to enlarge the original courthouse by constructing additional wings. On July 8, 1839, the design of architect Henry Singleton was adopted, and the court ordered engagement of a superintendent to undertake construction. Significantly, the latter order was quickly rescinded, and construction was to be directed by a committee of judges; Singleton was not appointed superintendent as well as architect until June 1841.

The cornerstone for the new construction was laid on October 21, 1839. As stated above, the existing building was to be enlarged; however, a perspective rendering in 1840 by Singleton's assistant, George Barnett, showed a completely new stone building in the Greek Revival style (see photo 1). It consisted of long east and west and short north and south wings with six-column Doric porticoes and a central octagonal drum topped by a low classical dome. Actually, the old building was still connected to the new construction until the winter of 1851-52 when it was demolished to make way for the new east wing (see photo 2).

Short north and south extensions and the lower rotunda were completed by the end of 1842; the west wing and the octagonal drum and copper dome were finished in mid-1843, the latter incorporating an oculus or round glass skylight and a balustrade at the top. On the first floor of the west wing was the courtroom where the Dred Scott cases were later tried. Although the west wing was occupied in 1843 and the exterior was described as completed that year, the portico columns and pediment were not actually built until late 1859. The roof was replaced in 1856--of technical interest was the use of sheet iron covered with copper, which was also used on the east and south wing roofs and presumably on the north. It was the earliest known application in the country and reflective of St. Louis's well-known use of iron in building construction.

On January 14, 1842, architectect Henry Singleton was dismissed and his successor, William Twombly, lasted about 18 months. For eight years thereafter, no architect was employed; the work was supervised under the justices' direction by a carpenter contractor named Joseph Foster, who would continue at the old courthouse for nearly 20 years. On two subsequent occasions the project was without an architect's supervision for a year at a time.

Besides firing architects and contractors, the justices frequently approved work or materials that the architect had rejected. On one occasion (March 22, 1842) mention is made of Foster being paid for quarrying and delivering stone and superintending construction, even though an architect was already employed as superintendent. Much later, in 1857, following resignation of architect Robert Mitchell because of an apparent excessive payment to a stone contractor, the court appointed as architect a contractor, Thomas Lanham, whose firm was working on the courthouse and who was a brother of Justice Phil Lanham. The contractor's firm under his partner's direction continued to work on the building. Public outrage subsequently caused the state legislature to abolish the county court and replace it with a board of county commissioners.

Evidently, the construction operation was fairly chaotic much of the time, raising serious questions about quality control, particularly regarding quarrying and fabricating the limestone facing for the cornices and pediments. Perhaps this uncertainty led Singleton to recommend limiting use of stone to the porticoes, with the body of the wings to be made of brick. Of course this may also have been intended to reduce costs, even though he might have wanted to use stone for its formal effect.

The new courthouse was officially opened to the public on February 22, 1845. The rotunda was praised and the building touted as the new capitol when St. Louis became the center of the country because of its strategic location. However, over the next six years, when relatively little exterior work was done, public dissatisfaction--led as always by the newspapers--grew over the building's unfinished condition and its disappointing dome, described as too squat for the expanded structure.

By 1851 the city's fivefold population expansion in 10 years and its heightened importance due to new territories extending the United States to the Pacific made it imperative to complete, that is, enlarge, the courthouse. Construction of a new east wing was ordered to replace the 1828 building, and Robert Mitchell was appointed architect and superintendent. The building as seen today essentially follows his design, shown in his perspective rendering published in 1854 (see photo 3).

Construction of the east wing began in 1852 and was completed by early 1856, construction of the south wing started in 1853 and was finished in 1858, and construction of the north wing began in 1857 and ended early in 1862. The entire courthouse was officially declared finished in 1862 (total cost $1,199,871), with the dedication taking place on July 4, 1862. Prior to this important ceremony, however, the most dramatic event in the drawn-out construction history of the courthouse had occurred: erection of the new dome which stands substantially unchanged today (see photo 4). Amazingly, the old dome had been removed in August 1857.

By the time of contractor Lanham's dismissal in September 1859, nearly everyone agreed that the old low dome had been out of proportion with the new extended wings. Architect Mitchell's general design shown in his 1854 perspective--in the High Renaissance style and somewhat resembling the domes of St. Peter's cathedral in Rome and St. Paul's cathedral in London--was well liked. After his 1857 appointment, Lanham had also designed a new dome in which he changed Mitchell's design by substituting cast-iron Corinthian columns for stone ones at the upper drum and by substituting consoles and "bull's-eye" windows for the engaged balustrade above the entablature and at the bottom of the dome.

William Rumbold, Lanham's successor in 1859 and the third significant architect for the courthouse, was asked to design a lighter dome as

Lanham's was considered too heavy. A controversy ensued among the city's architects and engineers; Rumbold was supported by Mitchell, and Lanham was supported by Singleton, the building's first architect. Rumbold won the day by building a small model and loading it with 13,000 pounds of pig iron to convince critics that his design was sound. A construction contract was awarded in January 1860, and the exterior work was finished by April 1861 (see photo 4).

The dome frame consisted chiefly of wrought-iron ribs and ties that were relatively light. The estimated weight of the dome--256,000 pounds--was far less than Lanham's proposal using heavy cast-iron plates. At the top of the dome just below the lantern was an oculus (round glass skylight) used to protect the rotunda because the lantern was not glassed in at that time. Atop the lantern was an ornate console base supporting a gilded sphere, which for reasons of economy, replaced the statue of "Blind Justice" proposed by Mitchell. A wooden flagpole was attached to the sphere, the latter 190 feet above the first floor.

On June 6, 1861, 15 persons attended a ceremony signaling completion of the new dome and lantern. Mementos and commemorative documents, including the names of Singleton and Rumbold, were placed in the gilded sphere.

At 10:00 p.m. on April 8, 1862, lightning struck the dome. According to newspaper accounts, no damage was done thanks to the lightning protection system. As might be imagined with a copper roof, the electrical display was spectacular.

A contract and specification of October 19, 1863, ordered the entire courthouse exterior to be painted. According to a newspaper story in 1865, a statement by the courthouse's amusing janitor referred to the "dingy white color" of the building.

In February 1869, one year and four months after William Rumbold's death, Thomas Walsh was appointed county architect and superintendent.

By January 1870 glass was inserted between the lantern columns, and the oculus was removed (see photo 5). During the same year a steam-heating system was installed. Also in 1870 the court ordered architect Walsh to "prepare a complete set of plans in book form of the courthouse as then existing." Unfortunately, the plans have never been found, if in fact they were ever drawn.

Walsh was succeeded in March 1872 by George I. Barnett, who had prepared the perspective rendering for Henry Singleton in 1839 and a design for the rotunda in 1843. Walsh replaced Barnett very briefly in 1873 just before the position was abolished.

A photograph taken in 1919 shows Corinthian capitals on the cast-iron columns both at the upper drum and at the lantern, but in a 1934 Historic American Buildings Survey (HABS) photograph, they no longer appear. From 1894 to 1914 numerous exterior changes, mostly minor, were made. At the basement, doors were converted to windows and iron window grilles installed. Steps and doors were removed at the first floor, and new revolving doors were installed at all four wing entrances. New 1-over-1-light sash were installed in most first and second floor windows. Small window openings were cut into the third floor walls of the north extension.

Documentary evidence does not indicate whether the basement areaways existed from the 1862 building completion date, but they do appear in early photographs. This question will be further studied in a later report that will also discuss the iron fence and other landscape features.

The major change during this period was the addition of the low boiler room in 1906 at the east side of the south extension. The room was built to house the new heating system installed in 1907. Additional window grilles may have been mounted at this time. The only other grilles mentioned in documents were those ordered in 1864.

The 1894-1914 changes described above were recorded in note form (author and date unknown but probably 1940-41) on HABS base drawings in the park files.

A public outcry demanded that the exterior of the old courthouse be painted in preparation for the 1903-04 centennial of the Louisiana Purchase. From 1864 the building exterior was painted every 10 years except for 1914. Both the interior and exterior were painted in 1921, the last painting until the National Park Service acquired title to the courthouse.

In 1930 the courts moved into a new building, and the little used courthouse was allowed to deteriorate, this being the time of the Depression. It was probably during this period of cursory supervision of the building that the acanthus leaf ornament was removed from the cast-iron Corinthian columns of the upper drum and lantern.

In June 1933 a committee of the St. Louis Chapter of the American Institute of Architects inspected the courthouse to determine urgently needed repairs and related costs. (The committee included John A. Bryan, who was the NPS resident architect at the courthouse from 1936 until 1959.) Their report presented in September 1933 expressed concern about fire hazards, particularly the deteriorated electrical wiring, warning that a fire could occur at any time.

In December 1933 the Historic American Buildings Survey was created and organized to permanently record U.S. buildings of architectural and historical significance. This activity was to be a collaborative effort between the National Park Service, the American Institute of Architects, and the Library of Congress. The program was also intended to give employment to architects during the Depression and was to be administered by the National Park Service. (A principal organizer and first director of the survey was Charles E. Peterson, also NPS chief of historic preservation until his retirement in 1962.)

Surveys, measured drawings, and photographs of the old courthouse were made in 1934 by a HABS team directed by Wilbur Trueblood; subsequent surveys were made up to 1941. From these materials working drawings were prepared for use in the first preservation effort.

In May 1936 a fire occurred, causing extensive damage to roofs and attics of the west and north wings and to the rotunda decoration. In June 1936 the National Park Service set up a temporary office in the courthouse to initiate planning of the Jefferson National Expansion Memorial at the Mississippi River levee. Eventually, of course, the memorial was to be realized in Eero Saarinen's soaring "Gateway Arch," from the national competition of 1947. However, the courthouse was needed as a vital element, and so with the assistance of the Jefferson National Expansion Memorial Association the boundaries were enlarged to include it. The courthouse was conveyed by the city to the United States on May 1, 1940.

Planning for restoration of the exterior and of selected interior spaces to the 1871 period began in the summer of 1940; this included providing for adaptive restoration of some rooms for administrative and museum use. This early restoration phase was substantially completed by September 1942.

Most important to the building's stability was complete reconstruction in 1941 of the deteriorated gable roofs of the wings and north and south extensions. In addition, the limestone chimneys, parapets, cornices, and pedestals were rehabilitated, and the nonhistoric skylights and ventilators were removed. The deteriorated exterior downspouts were replaced by new interior drains. The badly rusted cast-iron balustrade at the lantern was also removed, and sections were saved to make molds for later replacement.

The nonhistoric window sash and exterior doors were replaced in 1941, with some work possibly continuing into 1942. The National Park Service moved permanently into the south wing offices on December 1, 1941. In the same year the 1906 boiler house and chimney were removed.

The next major project in restoration of the exterior was the painting of the entire courthouse in 1942. This included the masonry walls and the drums above the wing roofs as well as the main copper dome and the copper dome of the lantern. (The 1863 specification does not include painting the domes.) The copper ball atop the lantern dome was covered with gold leaf to continue the historic treatment. During the winter of 1947-48, new 16-ounce copper was installed on the dome over the original 1861 copper (see photo 5).

The last major restoration period was 1952 to 1959, and most of the work involved interior spaces and landscape features (see photo 6). Some exterior doors and window sash, chiefly at the basement, were replaced or repaired, and new stone steps were installed by the city at all four entrances in 1955. That same year the courthouse exterior was painted light gray, instead of white, which drew favorable comments from passersby. Neither the main dome nor the lantern dome was painted. A new balustrade was installed at the lantern walkway. The landscape work accomplished in 1955-56 was altered in 1959, eliminating the walks and adding ground cover at the four courtyards.

In September 1961 the Klaric Contracting Company of St. Louis completed a major project that involved repairing or replacing sections of chimneys, parapets, and cornices, including raking cornices at the pediments. The parapets and tops of the horizontal cornice sections were sandblasted, sealed, and treated with water repellent in the fall of 1975. Also in that year, a section of cornice approximately 6' long by 2' deep by 1½' high on the north side of the east wing, a few feet from the portico, fell to the areaway.

In 1963 the building's exterior was painted again, except for the main and lantern domes, and a latex paint of a very light gray or off-white color was used.

Worth noting is the December 2, 1936, memorandum by W.C. Kerlin, an engineer with the NPS staff, who set up the temporary office in the courthouse in June 1936. The first two paragraphs are quoted as follows:

> I would like to record the following facts concerning the structural conditions in the Old Court House:
>
> A careful examination of the walls indicates that if there was any settlement in the foundations it must have been uniform. If any settlement took place it must also have been very slight since the condition of the entrance steps and the walls adjacent to the steps indicate no failure and no unequal subsidence. No records have been found indicating that piles were placed under the foundations.

Kerlin also mentioned wall cracks over some of the windows, particularly the two basement windows in the north and south walls of the east wing near the portico. He believed these cracks were caused by rusting retaining bars for the iron grilles covering the windows.

Kerlin made his inspection 32 years before the earthquake occurred at New Madrid in southeast Missouri in 1968; however, no known conclusive documentary evidence exists that indicates any significant change in the building's structural condition because of the earthquake.

Repairs to, or replacement of, portions of all basement windows and doors and emergency minor repairs to first and second floor windows were accomplished in 1975.

## DESCRIPTION

### OVERVIEW

The old courthouse is a limestone and brick structure, modified Greek cross in plan; there are four wings, two stories high with an attic and pedimented gables at the ends of the wings. At the crossing of the wings rises a large compound stone drum, which is surmounted by a copper dome and topped by a lantern. Restorations in 1940-42 and 1952-59 have returned the building exterior to its 1871 appearance.

The building site occupies an entire block measuring 257' north from Market to Chestnut Street and 301' west from Fourth Street to Broadway. Brick sidewalks in a herringbone pattern extend back from the curb 12' at Market and Chestnut streets, 15' at Broadway on the west, and 19' at the main (east) entrance on North Fourth Street. Sidewalks are terminated by a 6' high steel fence; 25' north and south of the east wing portico steps, which are 24' west of the street, the fence curves back 12' to form a shallow entrance court. At the three other wings the fence returns back 3' to the portico corners. All four porticoes include granite steps, which were installed in 1955 to replace the deteriorated original limestone steps.

The fences on the north, east, and west sides each contain a pair of gates, and mounted on the south section of the east fence is a large wooden sign identifying the memorial. The southeast quadrant, or court, has a sundial and a fountain, and the surface is grass as in the other three courts. The northeast and northwest courts contain stone column capitals that were salvaged from buildings demolished in the early 1940s on the site of the future expansion memorial. Each court contains a floodlight (currently inoperable) for illuminating the walls, drums, and dome. Areaways on the east, north, and west wings provide access to the respective basements; the south basement is reached by steps from the lawn. (Detailed descriptions and recommendations for treatment of the landscape features and areaways will be provided in a separate report.)

The courthouse proper runs 235' north-south and extends 257' east-west. The north and south wings are actually compound elements--north and south extensions (or hyphens) from the rotunda, terminated by east-west cross wings. The east and west wings are simple rectangles terminated by Doric colonnades. The central section from which the wings are generated is 62' square and houses the central rotunda. Above the wing roofs the rotunda is enclosed in two concentric stone drums succeeded by a large copper dome. The dome supports a terminal lantern, the top of which is about 200' above the sidewalk.

At the basement walls a limestone water table 7½" high and 4" deep extends around the east and west wings and the north and south extensions (the early structure), the bottom level with the portico floors and the top level with the first floor. All walls below this element are faced with limestone and are up to 5' thick. First floor level averages about 8' above the sidewalk, grade sloping up from north to south.

The east and west wing walls and the north and south extension walls are brick; however, the latter walls also contain limestone pilasters. Walls, columns, pilasters, and pediments at the east and west porticoes are limestone, as are the entire perimeters of the north and south cross wings.

First- and second-floor window openings (except north and south wings) and the portico doors are defined by projecting stone sills and stone surrounds. All windows and doors are wood; window sash and basement doors are painted black, and the wood frames are a medium-gray to match the adjacent masonry. Wood entrance doors are varnished and grained. Black wrought-iron railings flank the portico at the east, north, and west wings. There are 51 window air conditioners throughout the building.

At the tops of the walls and across the porticoes is a constant height limestone Doric entablature, the lower portion a plain architrave 3' 8" high, the bottom 32' above the first floor level. Over the architrave is the frieze, 4' 2" high, containing the traditional alternating triglyphs and metopes. The entablature is capped by a cornice projecting 2' 7" wide and 2' 9" high, 43' above the first floor level; 9' 6" above the cornice is the ridgeline of the gable roofs.

In back of the 2' 7" wide cornice top, a continuous 1' 6" high by 12" wide limestone parapet conceals the gutters. There are 25 limestone chimneys along the perimeter of the roof and 8 other chimneys elsewhere in the roof. Skylights are in the east and west wing roofs at the junctures of the ridges with the central stone drum. Roof scuttles are located in the east wing roof and in the north and south extension roofs. The roofs contain two floodlights to illuminate the lantern and the U.S. flag. At the ridges over the eight pediments are small limestone pedestals, or acroteria in classical term. These were intended to support carved stone ornaments called antefixae, which were never installed, probably for economic reasons.

## EAST WING

Several features of the east wing are identical with those of the west, north, and south wings, such as steps, columns, and windows; therefore, the description of this wing will generally apply to the others. Oldest of the wings built in the 1851-62 expansion, the east wing was erected in 1852-56 in the same location as the original 1826 courthouse, which was demolished in early 1852.

The east wing replaced the west wing as the principal entrance to the building following completion of the east wing in 1856.

The east wing, 91' 2" long and 61' 4" wide, is reached by Cold Spring, Minnesota, granite steps consisting of 14 risers 6¼" high and 13 treads

15-3/8" wide. The steps are flanked by 5' thick limestone cheek walls centered on the second and fifth portico columns. The tops of the cheek walls are flush with the portico floor, which is 7½" below the first floor. There are single-light windows 3' wide by 1' 6" high in the cheek walls below the steps, the heads 5' below the top of the walls. In the east wall sections forming the portico base and flanking the steps are identical 6-light, single-sash windows 4' 6" wide by 3' high. In the north and south portico walls are double-hung windows 4' 6" wide by 5' 6" high, the heads 2' below the water table. Concrete steps flanking the north portico wall provide access to the north areaway.

The limestone portico consists of six Greek Doric columns 30' 7" high, with capitals 2' 3" high by 5' 6" wide; the column shafts are 4' 10" in diameter with 9" flutes at the floor, diminishing to 4' in diameter with 8" flutes at the capitals (see photo 9). Columns are composed of six drums approximately 5' 2" high. In the frieze of the entablature above the columns, triglyphs consisting of three beveled vertical stone bands are 2' 4" wide, with rows of stone pegs or guttae at top and bottom. Metopes alternating with the triglyphs are 3' 9½" wide and contain 4" deep recessed panels 2' 5" wide by 2' 1" high. The limestone pediment rises 12' 6" from the frieze, containing a plain tympanum with horizontal and raking cornices. The top of the pediment is 52' 8" above the portico floor.

The portico is 11' 6" deep, with the inside wall emphasized at the corners by 4' 6" wide two-story pilasters with molded capitals. The portico sides and the front end bays have the original 3' high wrought-iron railings. In the three column openings facing the steps, the limestone floor panels have been replaced by Indiana limestone (date unknown but probably 1961).

There are three door openings 7' wide by 13' high at the inner portico wall, centered on the column openings, with one step at the center opening and three at the flanking openings. Each doorway contains a pair of four-panel oak doors 2½" thick with artificial graining last applied in 1975. The center opening is trimmed with a stone surround 12' 6" high, including a 3' 5" high entablature and 1' 4" wide pilasters. The adjacent doorways are finished with tapered stone surrounds identical to those at the windows along the north and south sides of the wing. Flanking the outer doorways are flat niches 3' 4" wide by 7' 8" high by 12" deep with bracketed cornices and sills, the latter 3' 1" above the portico floor. The heads of all five masonry openings are at the same height and at the same level as the first floor window heads at the north and south walls. Over these portico openings, at the second floor, are five windows without surrounds; otherwise, they are identical to those at the north and south brick sidewalls.

These walls are punctured by six equally spaced window bays at the basement, first, and second floors. All windows are double-hung with 6-over-6 lights (see photo 11), except at the north wall where there is a 5' wide by 8' high basement doorway at the west end of the areaway. Basement window openings are 4' 6" wide by 5' 6" high, with heads 2' below the water table, and are covered by wrought-iron grilles hooked outward at top and bottom; similar grilles occur at the portico base windows. At the west end of the north areaway in the north extension wall is a door to a tunnel leading to the west areaway.

First floor window openings are 4' 6" wide by 11' 2" high, with sills 2' 8" above the water table; second floor openings are 4' 6" wide by 10' high. All have stone surrounds projecting 3", with 3½" fillets, 1' 2" wide at the 7½" high sill, tapering inward to 12" wide at the head section, which projects 2" past the jambs. (This ornamental device is known as an ancon in classic Greek usage, the tapering used to create an illusion of perspective.) There are no attic windows.

## WEST WING

Documents state that this wing was completed in mid-1843; however, a later entry establishes conclusively that the portico columns and pediment were not built until late 1859. It should be noted here that the similar porticoes and pediments originally intended to terminate the north and south extensions, as shown in the 1840 rendering of Henry Singleton's design, were never built (drawing 1). Instead, the existing north and south cross wings were actually constructed (also see drawing 2).

Singleton's design also envisioned symmetrical east and west wings, each containing five bays of windows; however, the new east wing was built with six bays. No doubt the pressures on the judges for additional space caused this abandonment of classic balance. Thus, the length of the west wing, less steps, is 72' 6" compared to the 91' 2" length of the east wing; the width of the west wing is approximately the same as the east wing, 61' 8".

The west portico is almost identical to the east portico except that the granite entrance steps containing 11 risers with limestone cheek walls run the full north-south width of the wing; also, the steps project 14' from the portico versus 17' 3" at the east portico (see photo 22). In the north and south portico limestone basement walls are 8-light, single-sash windows 4' 6" wide by 3' high. Below the windows are concrete steps descending to the areaways running the full length of the wing. At the east end of the north areaway, in the north extension wall, is a door to the tunnel to the east areaway.

Basement windows and grilles in the west wing are the same as in the east wing, but the window heads are 3' below the water table instead of 2'. In each wall centered on the middle first floor windows is a pair of five-panel wood doors 4' 6" wide by 7' 10" high. The same doors also occur at the east end of the north wall, next to the north extension.

The inner portico wall contains three masonry openings at the first floor in contrast to the five openings at the east portico. The three openings are each 7' wide by 13' high and contain a pair of three-panel, artificially grained oak doors. The doors flanking the center entrance are permanently closed. All three openings are trimmed with tapered limestone surrounds, or ancons, identical to those at the doorways flanking the east entrance doorway and the upper windows of both wings. There are wrought-iron railings at the sides of the portico but not at the front.

The five second-floor portico windows and those at the brick sidewalls are the same as those in the east wing (see photo 23). The west wing attic contains a top-hinged, single-light window at each sidewall, 2' 6" wide by 2' 2" high and 7" above the architrave, in the second metope space from the west walls of the extensions.

## NORTH WING

The extension or center section of this component, together with the corresponding south section and the lower rotunda connecting them, was completed by late 1842. The north cross-wing section was completed in early 1862.

The extension runs 37' 8" from the rotunda section to the north cross wing. In the east and west extension walls about 12' 2" back from the cross wing are the outer corners of 4' 6" wide, two-story limestone pilasters with 6" projection, marking the back or inside corners of the north end of the 1842 extension. One of the pilasters definitely shows in the south wing of photo 2. The pilasters are identical to those elsewhere in the building.

Between these pilasters and the east and west wings the brick walls contain two first-floor and two second-floor windows, the same design as the windows in the east and west wings. The typical 7½" water table 2' 8" below the lower window sills continues under the pilasters and then stops.

North of the pilasters the space originally intended as a portico has been closed in by mullion, or paired, double-hung 6-over-6-light windows at each floor, separated by a deep stone entablature over the first floor pair. Beneath the window sills are 1' 9" high recessed wood panels. Both pairs of windows are flanked by 12" wide stone pilasters and are smaller--3' 9" wide by 10' high--than the typical windows. There are no water tables under the first-floor windows.

In the south ends of the east and west extension walls are doorways approached by three stone steps, each containing a pair of three-panel wood doors 5' wide by 5' 11" high. As previously mentioned, these lead to a tunnel connecting the north areaways of the east and west wings. The rest of the extension foundation is unexcavated. At the extension north end are slender pilasters 12" high by 6" wide with typical capitals, making a transition with the north cross wing from basement wall to architrave. At the attic in each extension wall are top-hinged, single-light wood windows 2' 6" wide by 2' 2" high in the first, second, third, fourth, and sixth metope spaces north from the east and west wings.

The north wing--all limestone--measures about 120' long along the north front and 38' 9" deep at the east and west ends, which project out 29' 7" from the extension. The north portico, which is 63' 4" long and approximately 11' deep, differs from the east and west wing porticoes in that it has only four columns, the end columns being replaced by pilastered wing walls (see photo 15). Also, the narrow steps, only 7' wide and containing 14 risers, do not extend out from the portico floor as the other two porticoes do but are cut into it between the two center columns. The steps contain a steel gate, and the four intercolumnar spaces contain 3' high wrought-iron railings.

According to a court order of March 7, 1860, the north facade was to include a center pilastered projection or pavilion, identical to the earlier south wing; however, the order was rescinded on March 15, 1860, and the design approved for the existing colonnade actually built.

The basement wall projects 8" out from the main wall, the upper surface level with the portico floor, and it is surmounted by a 7½" high stone band set back 1". This element is at the same level as the water table existing elsewhere and forms a base for the pilasters throughout the wing. The basement top stone course is 1' 4" high instead of 12" high as it is on the east and west wings. Areaways skirt the east, south, and west basement walls and terminate next to the portico at steps and steel gates to the north sidewalk. In the portico north base wall are two windows on either side of the steps, 4' wide and 6' high, the heads two stone courses or 2' 4" below the basement wall band. In the east and west portico base walls are a pair of five-panel doors 4' 6" wide by 8' 5" high with heads 12" below the window heads.

Adjacent to these doors in the main (north) basement wall are two pairs of six-panel doors 4' 6" wide by 8' 10" high with heads level with the basement window heads. A similar pair of doors occurs at the east end of the south basement wall next to the west extension wall. West of these doors is a 4' 6" wide by 6' 7" high window; the same window occurs opposite in the north wall, and there are three in the west end wall. At the east end of the wing basement are three identical windows in the east wall, two in the south wall, and one in the north wall. Except for dimensions, all basement windows and wrought-iron grilles are similar to those in the east and west wings.

The inner portico wall contains five openings at each floor, centered on the intercolumnar spaces and flanked by 4' 6" wide pilasters projecting 6". The center doorway is 7' wide by 13' high, framed by narrow pilaster jambs and capped by a 2' 6" high entablature, and it contains a pair of three-panel oak doors with vertical graining. The two windows on each side of the doorway and the five at the second floor are typical except they do not include tapered limestone surrounds. The original limestone floor panel in front of the doorway has been replaced by a concrete panel.

The east and west ends of the wing include four typical two-story pilasters flanking three windows at the first and second floors; at the corners the pilasters return on the north and south walls, each of which contains two windows at each floor. All windows align with the basement openings and are identical with other typical window openings except for the absence of limestone surrounds. Columns, entablatures, and pediments are the same as those at the east and west wings; however, the gable roof ridges are lower because the north cross wing is narrower, 38' 9" versus 61' 6".

Attic windows, identical to those in the north hyphen, exist at the north and south walls in the second, fourth, and fifth metope spaces east and west of the extension. These windows were probably part of the original construction. There are no attic windows in the east or west pediments nor in the north (main) pediment.

## SOUTH WING

With one major exception and a few minor exceptions, the south wing is nearly identical to the north wing in overall dimensions, design details, wall materials, and window spacing and size. The center section, or extension, was completed with the connecting lower rotunda and the north extension in late 1842; the south cross wing was built in 1853-58.

At the section south of the pilaster marking the end of the early extension, the infilling mullion windows enclosing the space originally intended as a portico differ slightly from those at the north wing. The first floor opening contains a pair of double-hung 6-over-6-light windows, surmounted by 3-light transom sash which do not occur at the north wing.

There is no continuous areaway skirting the south wing as in the north wing. The north basement wall, west end, contains one 3-light window 4' 6" wide by 2' 6" high in a small concrete window well. The adjacent west wall contains three similar windows and wells. The east end of the north wall is blank, the early window opening and the door opening to the 1906 boiler room having been closed up when the boiler room was removed in 1941. All basement windows at the south wall open at grade. The two windows in each of the east and west sides are 6-light, top-hinged, and 4' 6" wide by 2' 3" high; the four windows in the center section flanking the doorway are 4' 6" wide by 2' 7" high. The east wall contains two windows with sills at grade at the south end, similar to the west wall windows, 4' 6" wide by 2' 6" high.

North of these windows is a concrete areaway 3' 6" wide by 6' 8" deep with concrete steps to a pair of two-panel doors 4' 6" wide by 6' 6" high. At the top of the areaway is a wrought-iron railing 3' high and similar to those at the porticoes. All basement windows are covered with wrought-iron grilles. At several of the grilles, the rusted anchors connecting them to the walls have cracked or spalled small sections of the stone jambs.

The major departure in design of the south wing from the north occurs at the south facade (see photo 28). There is no columned portico; instead, the wall breaks out 4' 6" to the south, 28' 2" from the east and west corners to form a shallow projection, or pavilion, 62' 9" wide, which is essentially the same width as the north portico. The pavilion south face contains six two-story pilasters, returned at the corners, and identical to those used elsewhere except that the reveal or projection from the nominal wall plane is deeper, 1' 3" compared to 8".

From the pavilion eight granite steps 7' 6" wide extend 5' 6" south to the sidewalk and are flanked by sloping limestone cheek walls 4' 6" thick. The steel fence and granite base wall that surround the courthouse terminate at the east and west ends of the pavilion, without gates. A unique feature of the building is four first-floor windows flanking the doorway that are covered with wrought-iron grilles. The doorway contains a pair of artificially grained oak doors, 7' wide by 13' high.

Unlike the north and west wings, there are no windows in the attic of the south wing or extension.

## OCTAGONAL LOWER DRUM

This component is the original stone drum completed with the west wing in mid-1843 and followed construction of the north and south extensions and the lower rotunda in 1842. This lower drum forms a transitional enclosure for the middle part of the interior rotunda, beginning at about the fourth level gallery and ending at the base of the circular drum, above which the dome encloses the upper rotunda space (see photo 51). The height from the gable roof ridge is about 14' to the top of the octagonal drum cornice, which is 65' 6" above the rotunda floor.

The base element is 66' 6" in diameter and rises approximately 1' 6" above the ridges; then the wall breaks back 6" and divides into eight identical sections 26' wide by 9' high containing 4" deep recessed panels measuring 23' wide by 4' high. The plain cornice above is topped by an octagonal parapet 1' 6" high and set back 12"; the total height of both is 2' 6". The parapet projects 12" minimum beyond the upper drum base to approximately 3' 9" maximum at the points of the octagon and provides a nearly flat transition to the circular upper drum.

## CIRCULAR UPPER DRUM

This elaborate upper component was built with the dome and lantern in 1860-61 (see photo 52). The drum has a base element rising 7' above the octagonal lower drum, and at the bottom are two bands, or fasciae, 1' 6" and 10" high. The cornice topping the base is smaller than the one at the lower drum, 1' high and the same projection; its top is nearly flat and approximately even with the fifth level balcony floor, 73' above the rotunda floor.

The overall height of the upper drum proper is about 24' including an elaborate entablature with bracketed cornice that is 5' high and projects approximately 3'. The cornice is massive, being over 6' thick at its greatest extent, with an essentially flat top 96' 6" above the rotunda floor.

The compound upper drum comprises a ring of 24 cast-iron Corinthian columns 19' 2" high and 2' average in diameter encircling an inner masonry wall 2' 9" thick, which contains 24 round-headed window openings 2' 8" wide by 10' 4" high. The sills are 2' 4" above the stone ledge. The original acanthus leaf ornaments that once graced the column capitals were removed, probably sometime between 1930 and 1934 when the courts had left and there was little control on building use (they have subsequently been lost). Above each window opening is an 8" deep recessed panel measuring 3' 8" wide by 1' 4" high, the top of which is about 1' 4" below the architrave of the entablature. Flanking each window opening at the spring line of the circular head are cornice moldings 8" high simulating the tops of pilasters, the molding levels corresponding with the pilaster moldings inside the rotunda. Also, the exterior columns are paired on the interior of the rotunda with wood Corinthian columns.

The fifth level gallery windows are double-hung 1-over-1 lights with the glass treated to create a decorative etched or frosted pattern (see photo 60). These 24 double-hung windows contained clear glass when installed in 1861. The lower sash contained 6 lights, 3 over 3; the upper sash contained 3-over-3 lights plus a fan of 4 curved lights above to fill the circular top of the sash. Before late 1869 these sash were replaced by single-light sash containing an etched design, probably to reduce heat and glare at the fifth level gallery. The top arched sash is 2' 8" wide by 5' 3" high while the bottom sash is 2' 8" wide by 4' 8" high.

Four painted copper downspouts 4" in diameter run down the face of the upper and lower drums from the copper dome above, terminating at the main roof. These downspouts were most likely installed when the dome was reroofed with copper in 1948; however, according to the records, downspouts have been here since the dome's completion in 1861.

## DOME

The present copper covering of the dome was installed in the winter of 1947-48, and according to the contract, the 16-ounce copper furnished by the government was to follow the existing covering (apparently the original installed in 1861) in every detail. Work did not include the dome base below the gutter.

Like the circular stone drum, the copper dome consists of three sections--a base resting on top of the elaborate cornice of the drum, the dome itself, and a top ring or crown, which carries the balustrade circling the promenade or walkway at the base of the lantern (see photo 49). The dome base is 96' 6" above the rotunda floor, and the top is 135' above the floor, making the dome height 38' 6".

The base is 60' in diameter and 8' high, the bottom portion a continuous ring 2' high with 24 plinths that are 2' 4" wide, set 8' apart, and project 1' 3" (see photo 52). Above each plinth is a console or curved scroll-like element 5' 2" high; the consoles are topped by projecting sections of a 10" high by 12" deep cornice containing a concealed gutter. There is a drip groove at the bottom outer edge of the gutter. The 24 consoles are centered on the columns of the drum below and flank 24 portal, or bull's-eye, single-light windows 3' 6" in diameter with 6" wide casings that project 2". The sills are 2' 4" above the base, and the sash are recessed 6½". Four sash are set in deeper (2' 2½") than the others and are located in stair recesses at the northeast, northwest, southwest, and southeast points of the dome base. (Only the northeast and southwest stairs were actually built. The removable sash at the northeast stair provides the only access to the stone ledge below the windows.)

Except for the portal wood window sash, the balustrade, and the walkway floor (including the 4" exposed vertical edge of the concrete slab beyond the balustrade), all exterior surfaces are copper. The copper gutter extends behind the plinths--actually just copper plates--at the feet of the dome ribs.

Like the base the dome proper has a compound bottom ring containing 24 plinths. Both ring elements are 1' 10" high, and the plinths are 2' wide and 12" deep. The 24 ribs on the dome proper are set 8' apart. Each rib begins with a 1' 6" high hoop at the plinth and runs up the curve of the dome approximately 30' 8" where it merges into a 3' wide flat band abutting the crown. The size of the ribs diminishes from 1' 7" wide and 9" deep to 10" wide and about 2" deep at the flat band where they are 4' 8" apart. The total developed length of the curved dome surface is about 33' 8".

Between the ribs are panels recessed the same depth as the ribs, terminating in semicircles at the bottom and top, and the panel flanges decrease in width with the ribs as they rise. Both ribs and panels are formed in 1' 6" high sections with flat seams.

The crown under the walkway is 27' in diameter, the upper edge being 3' 10" above the flat band. About 12" back from the edge--actually the 4" exposed face of the concrete floor slab of the walkway--is the cast-aluminum balustrade. The balustrade, which has a medium sandblast finish, is 3' 6" high and consists of eight sections of six balusters separated by eight 1' 6" wide piers, the latter concentric with the eight lantern columns.

The circular walkway floor is 3' wide and is finished with 6" by 9" red quarry tile set in roofing cement over a five-ply felt and tar membrane; the latter in turn covers a concrete slab. The slab was installed in a mastic bed on the original ca. 1862 walkway composed of a cast-iron grid filled with thick bull's-eye glass lights. The tile and membrane were installed in 1955, as was the existing copper-covered roof scuttle. The concrete slab was probably constructed in 1941-42 to stop leaks. The walkway floor is approximately even with the oculus or interior opening at the lantern base, which terminates the upper dome of the rotunda.

## LANTERN

Although the smallest component of the old courthouse, the lantern is possibly the most interesting, with its changing forms, lively details, and variety of materials (see photos 54 and 55). Like the dome and drums below, the lantern is a carefully integrated succession of elements, including a windowed base, a colonnaded and glazed center section, and an elaborately worked dome topped by an elongated gilded sphere and a 45' aluminum flagpole. The overall height from the gallery floor to the top of the sphere is 42' 6"; the heights of the base, lantern proper, and dome are 8' 6", 15', and 9' 6", respectively.

The base is 18' in diameter with an 8" curb forming a sill at eight window openings 2' 6" wide by 4' 4" high. The openings contain plain single-light casement sash--four with wire glass installed in 1955--all with plain frames. Only one original sash remains, including 1" thick leaded glass. During its rise the base steps back to a 17' diameter at the 9" deep fascia over the window openings; above is a 9" high simple cornice projecting 10". Beyond the cornice the walls rise 10" to a section sloped back at 45° to the base top 12" above. Except for the windows the exterior covering is copper painted white over wood framing and sheathing; the windows are black. In the fascia over four of the windows are 6" sloping segments of 2" round copper drain.

From the base rise eight hollow cast-iron tapered Corinthian columns that are 11' 6" high, 1' 1" average diameter, ½" thick, spaced 4' 3" apart, and painted white (see photo 54). Capital acanthus leaf ornaments are missing, possibly stolen as previously suggested in regard to the upper drum columns. The column centers are 2' 4" back from the sloped edge of the base. Columns are ornamental only; the lantern above the base is supported by twin wrought-iron braced channels set on the compression ring of the main dome and extending up through the columns to a cast-iron bearing ring 13' in diameter which supports the lantern dome.

The columns carry an architrave and frieze totaling 2' 6" in height; above is a 12" high cornice projecting 1' 6" and terminating at the lantern section. At the cornice bed mold is a ring of dentils 3½" square and 2" apart. All three elements are of white-painted copper formed to wood framing and sheathing. The entire entablature, although much smaller, has a strong resemblance to that of the upper stone drum.

Between each pair of columns is a glazed metal closure 9' 9" high by 3' 1" wide (see photo 54). These closures connect at each column to a 2" wide by 3" deep cast-iron jamb unit in the form of a narrow pilaster. The glazed closures are comprised of three cast-iron grid units, each divided into 25 bull's-eye lights, five horizontal and five vertical, in the shape of modified octagons 7-3/4" high by 7½" wide. At the interstices of the octagons are 2" square small diamond lights. The cast-iron grid frames are 1½" deep, the face dimensions of the ribs are ¼", and the few surviving pieces of original glass are ½" thick, apparently leaded. Other lights range from 1/16" to ¼" thick. Cast-iron grids and jambs are painted black.

The areas between the tops of the cast-iron grids and the bottoms of the architraves have been filled in with wood frames covered with white-painted copper. The bottoms of these panels are round arches springing from the iron pilaster jambs adjoining the columns and covering the tops of the grids. Curved wood members are inserted in the arches between the copper facing and the grids; however, the result is crude, because these filler pieces abut the grid frames, leaving gaps at the glass sections.

Another peculiar detail occurs at the interior. The round-head plaster panels between the columns do not stop at the pilaster jambs; instead, they pass 2-3/4" beyond them to the first tier of octagonal lights and are scribed snugly to both the glass and the cast-iron frames. Both of these details may have been constructed after the original enclosure of the intercolumnar spaces in December 1869 or January 1870.

Above the cornice surmounting the glazed frames are two regressed rings forming the base of the lantern dome; the lower ring is 13' 6" in diameter, 1' 9" in height, and projects 6" beyond the upper ring, which is 12' 6" in diameter, 1' 2" in height, and extends 4" from the dome proper. These elements are white-painted copper like the other sheet metal below. In design, they reflect similar rings at the base of the upper drum.

The main portion of the dome, diminishing as it rises from 11' 10" to 6' in diameter, has a striking scaled copper surface resembling a pineapple or an acorn husk (see photo 55). This covering contains hundreds of copper plates, identical in design but decreasing in size in successive upward courses. It is succeeded by a heavy molded copper element constituting a Corinthian column base, 2' 4" high and with a 4' 9" average diameter. Above are four 2' 4" high copper consoles, or scrolls, supporting an 8" high by 2' 7½" diameter flat copper ring. (The consoles recall similar units at the base of the main dome.) All these surfaces have an odd and interesting appearance, resulting from the chemical interaction of natural copper with the remains of paint from the 1942 treatment, normal weathering, atmospheric pollutants, and extreme exposure.

Topping the dome structure is an elongated copper sphere 5' 3" high with a 3" projecting band 12" high and 4' 6" in diameter at the center. The sphere has a gilded surface, last done in 1942, and is approximately 181' above the rotunda floor and 190' above the sidewalk at the east portico. A 45' aluminum flagpole carrying a small U.S. flag extends from the sphere. The first flagpole atop the lantern was erected in 1861 and was probably made of wood because it reportedly collapsed. A replacement in 1874, which may again have been wood, lasted only until 1884. The subsequent replacement may have been wrought iron or steel because no information concerning other flagpoles is recorded until 1971 when the existing steel pole was replaced by the present aluminum pole.

## EXISTING CONDITIONS

In addition to providing an overall appraisal of the condition of materials and of the structural problems of the courthouse, this section gives detailed analyses of the condition of various building components.

### GENERAL

With the exceptions noted, the exterior of the building is in better condition than it appears. There are no signs of significant structural settlement or displacement. The walls are plumb and straight, and most of the stone cracks are localized and do not violate the integrity of the structure. The deteriorated lower wall cornice sections are a serious problem, as discussed later.

Mottled, dirty, blistered, and peeling paint on the masonry surfaces gives the building its shabby appearance, notably at the stonework. As many as 20 coats of paint have been identified, the most recent a latex coating applied in 1963. Previous coats were lead and oil, and in many cases, the earlier painting did not include proper cleaning, which, besides dirt accumulation, permitted lichen growth.

The stone is nearly all crystalline, fossiliferous limestone (some blocks are sandstone) of Mississippian age, containing numerous unconsolidated fossil shell fragments. The limestone blocks may also contain natural lines of separation in the otherwise uniform rock mass. They include intrusions of clay 1 to 2 mm thick, called stylolites, which occur during the rock formation process and become surfaces of weakness and potential failure. The frequency of stylolite or crow's-feet joints is quite irregular--some blocks are cut by several joints, some blocks by none. Some of these joints are parallel to the direction of the stone, and some are at approximately right angles.

The lowest of the three stone courses comprising the cornice must be carefully inspected to determine the direction and condition of these stylolite joints. When they run parallel to the wall surface, the projecting portion of the stone runs a high risk of separation. This weak joint is treated to the full weight of the cantilevered portion of the stone and the two courses above it. Since the cornice is covered with up to 18 layers of paint, these features are currently difficult to impossible to detect until the surface is cleaned.

The discussion above has greatest significance to the wing roof cornice topping the lower walls, and to some extent, to the upper horizontal surfaces elsewhere. The cornice sections are large (average 6' long, 2' 7" wide and 2' 9" deep) and are highly exposed. In addition to weathered joints or fissures on the top surfaces and vertical edges, these areas are, in some cases, heavily eroded by water, causing scaling that is aggravated by frost action (see photos 36 and 39). Some of the upper layers were so badly deteriorated by 1961 that they were replaced by Indiana limestone. The entire cornice perimeter, the parapet walls, and the sloping tops of the pediments were sandblasted and treated with Hydrozo water repellent in 1975 to prevent water intrusion. In addition, the horizontal joints in the cornices were filled with sealant capped with lead, and the vertical joints in the cornices and both joints in the parapets were filled with sealant.

A detailed visual examination of the main cornices will be conducted when scaffolding is erected to remove paint from the walls. At this time, a more precise evaluation can be made of the spalled sections of the crown molding and of the missing guttae under the frieze (see photos 37 and 38). There are perhaps 25 small chipped sections (under 12") and 10 larger ones (12" to 24"). Given the basic composition of the stone and the doubtful quality control during the haphazard construction of the building, minor defects should be accepted as wear and tear and left as is; larger defects will require corrective action.

Approximately 20 to 25 percent of the cornice sections will eventually have to be reinforced or partially replaced. This very conservative estimate is a compromise between the most extreme possibility of total replacement and the most optimistic estimate of no replacement. Flashing and gutter details in the 1977-79 roof and roof drainage repair contract were designed to permit this replacement. Design of the steel roof framing installed in 1941 is such that no lateral thrust is exerted against the tops of the exterior walls at the cornices, as erroneously stated in earlier reports. The interior faces of the walls require some repointing because of water leaks, especially at the north wing, but the condition is not structurally serious.

The parapet wall sections have weathered but not nearly as badly as the cornices, and they are almost entirely free of the fissures described in the cornices. The pedestals and chimneys, which were extensively repaired in 1941 and received supplemental work in 1961 and 1975, are in good to excellent condition. An exception is the appearance of the chimneys, which generally were crudely repointed and contain discolored sections of stone because it was anticipated that these blemishes would be concealed by paint. This was not done in the 1963 latex repainting. The repairs that were made to the wing roofs and roof drainage system also included repairs to the two skylights and new flashing at chimneys, roof scuttles, vent stacks, and the lower drum.

Pediment walls are stone and the walls below the cornice line elsewhere are variously stone or brick. Stone blocks are generally 4' long, 12" high, and 8" thick, with vertical joints offset 12". Joints average about 1/8" thick and were generally filled with a hard lime mortar; however, mortar was fallen out at many drum joints, and in some cases blocks were set with no mortar. In areas where paint still protects the surface, the original decorative tooling is clearly seen, a good indication that painting was not intended in the initial design. Even where the paint has weathered off, the stone (except cornices and drums) shows little erosion. The most noticeable defect is a number of cracks about 12" long scattered around the building, frequently through lintels, and totaling perhaps 25, 3 or 4 of which are fairly serious. The latter were most likely enlarged by water penetration and subsequent frost action.

Because there is no clear pattern to the cracks indicating unusual stress in any particular area, it is the writer's firm opinion--supported by structural engineers--that the cracks occurred early in the building's life from the overall settlement, inevitable to some degree in any masonry structure (see Kerlin's quote in the historical background portion of the "Introduction"). That the cracks have not enlarged in recent years is indicated by photographs taken in 1942, which show that some cracks appear exactly as they do today. Most of the mortar joints in these lower walls are sound and tight.

The brick is laid in running bond, has a fairly hard surface, and is medium red in color. Mortar joints are ¼" wide, slightly concave, and contain a very hard lime mortar including fine colored sand. The joints are in good to excellent condition, and there are no noticeable cracks in the brick.

In regard to brick, a peculiar condition was observed in the east wall of the east portico just south of the cheek wall of the steps. A section of brick four or five courses high and 4' south of the cheek wall is set into the stone at grade. Although the reason for this condition was not identified, it seems probable that the brick filled in an early basement entrance.

Condensate from the window air conditioners has stained window sills and walls. Most of this appears to be limited to the paint, but the staining may also be affecting the stone and brick beneath. A positive method of keeping the condensate clear of the masonry surfaces should be devised before the walls are cleaned and repainted, if the air conditioners are to remain.

Although this historic structure report focuses on the exterior of the courthouse, several related interior features should be noted. Spaces under porticoes and steps have suffered from excessive humidity, resulting in deteriorated mortar. The space at the east portico steps is still very damp, and ventilation should be provided; the condition at the west portico is similar but less severe. While the structural elements in these spaces are basically sound, the brick walls and vaults should be repointed. The same is true of the pipe tunnels running from the south basement to the east, west, and north basements.

Portions of some of the floors have been replaced with reinforced concrete, chiefly in 1945-46. This work would certainly have strengthened the building; nevertheless, the park staff reports that floor vibrations can be felt in the area of the superintendent's office and the library, in the southeast and northwest corners, respectively, of the second floor. This condition will be analyzed in the phase III interior report.

The floodlights installed in the mid-1960s in the four courtyards and in the portico ceilings are not used in order to conserve energy. Condensation has caused their deterioration; replacement will be necessary if a change in energy policy permits floodlighting.

The park intends to have the areaway drains cleaned when the basement drains are cleaned. During the process drain sizes and capacities will be determined. If required, additional investigation of the areaway drains might be accomplished for the mechanical portion of the phase III report.

## EAST WING

The most glaring defect in the east wing is the void in the cornice at the north wall near the portico pilaster. It was caused in 1975 when a section about 6' long, 1' 4" high, and 1' 9" deep fell out because of a separation at a stylolite or line of weakness (described earlier).

Over the basement window near this location the lintel and the stone sections above have pushed out from the wall about 1" (see photo 32). A similar condition exists at the corresponding window in the south wall. Both of these defects look the same today as in 1942 photographs. Since window air-conditioning units had not been installed then, the defects could not have been caused by condensate drip. The defects were probably caused by early settlement, aggravated over many years by water intrusions and subsequent frost action.

Other than the conditions described above and the cornice defects discussed earlier, the stone and brick surfaces appear to be in good condition; however, a conclusive evaluation can be made only when the paint is removed. The entrance doors are in excellent condition, as are the first and second floor windows except where condensate staining has occurred at wood and stone sills. The basement windows and door are in good condition, requiring only minor repairs. All windows and the basement door will require partial paint removal to reduce paint buildup and repainting with the correct color to restore the historical appearance.

## WEST WING

The west wing appears to be in somewhat better condition than the east wing, displaying fewer chips in the cornices and cracks in the walls. An exception is a peculiarly deteriorated 4' long section of west portico base wall just east of the small window and the areaway steps, 3' 2" high above the area walk. The stone surface is roughly eroded to a depth of about 1". It is not known what caused this condition, but it has apparently been arrested.

## NORTH WING

In addition to fissures and spalled sections in the cornice moldings and scattered wall cracks, the north wing has the following specific defects:

severe cracks in the lintel over the tunnel door in the west extension wall

a 5' long deteriorated section of crown molding of the horizontal cornice at the southwest corner of the west wall

a 2' section of cornice crown molding missing at the northwest corner of the north wall

## SOUTH WING

The only major defect observed in the south wing exterior is a 2' long section of molding that is missing from the south cornice near the southeast corner of the wing.

## OCTAGONAL LOWER DRUM

The octagonal drum is more seriously deteriorated than the lower walls below the main cornice because of severe exposure, poor quality of some stone, considerable inferior mortar and pointing, and age (see photo 51). Joint mortar has washed out in places to a depth of 1' 6". Numerous blocks have been positively identified as sandstone instead of limestone, set with the bedding planes vertical instead of horizontal, and more are suspected. The surfaces of these sandstone blocks have spalled off up to 1" in depth because of their fine, soft composition. The sandstone is a local ferruginous, calcareous siltstone composed of extremely fine (less than 1/16 mm) quartz grains. The majority of blocks are 1' by 4' face dimension, 8" thick.

At the cornice, irregular pieces up to 12" long have spalled off, and these limestone blocks contain numerous fine fissures and a good deal of surface abrasion. Mortar has washed out of many joints. These conditions are probably due in large part to penetration of standing water through the nearly flat top horizontal surfaces and further aggravation by freeze-thaw action.

## CIRCULAR UPPER DRUM

Like the lower drum the upper drum contains mottled and peeling paint, which contributes to the shabby appearance and conceals the stone condition (see photo 52). However, it is in better condition than the lower drum, partly because it is 17 years younger. The cornice of the base, while abraded at the edge, shows little of the fissuring and spalling evident below. The ledge joint with the wall, behind the columns has deteriorated, and water has leaked through the wall, causing plaster and some mortar deterioration in a small area of the northeast inner wall of the stairway between the fourth and fifth levels. Water penetration at the corresponding location in the lower drum has added to this problem. There is no evidence of continuing water intrusion because the joints have been caulked in recent years.

The walls behind the columns are in fair to good condition, with no displacement and apparently sound joints except at the keystones of the arched window openings, where mortar has washed out in several places (see photo 61). Perhaps a dozen cracks have appeared in the soffits of the architrave blocks, in some cases extending up the face of the architrave, and in a few places into the frieze blocks above.

The cast-iron columns have roughened surfaces due to paint buildup and accumulation of pollution deposits caused by chemical reactions (see photo 62). There is no evidence of splits, cracks, or sections broken off at the capitals.

Possibly three or four window frames have deteriorated and require replacing, but the sash generally appear to be in good condition. Like the lower wall windows, the drum window frames are painted light gray to match the walls and the sash are black. Frames have been caulked, and the sash have been sealed with Styrofoam strips, which have eliminated drafts and moisture infiltration. There is no evidence of recent leaks. A conclusive determination of the window condition, as of the stone, will require paint removal.

During the 1955 rehabilitation contract, broken lights in four upper sash and six lower sash were replaced with clear glass. Deteriorated portions of the window sash were replaced during the 1980-81 rehabilitation of the drums and dome. None of the clear glass was replaced by reproduced etched glass during the contract work. Currently, 7 top window sash and 15 lower window sash have the original etched glass replaced by clear glass. One of the original lower window sash glasses is cracked. The remaining original etched glass panels are in good condition.

Of the 96 stone modillions (four per window bay) or brackets at the underside of the cornice, five have broken or fallen off (see photo 63). Remaining modillions and the soffit are heavily encrusted with dirt from airborne pollutants.

The crown mold of the cornice is abraded from weathering, including water running over the edge. There are a few chipped or spalled places, all less than 6" long. The top surface of the cornice appears sound and undistorted, although it could not be examined in detail because of heavy paint buildup. This surface was not sandblasted and treated with Hydrozo as was the top of the main roof cornice, nor have the horizontal joints been capped with lead as in the main cornice.

## DOME

The elaborate dome base is built with wood sheathing and blocking connected to the inner iron ribs, and the wood framing is covered with copper that has been painted. Although the paint covering made a thorough examination impossible, the copper appears to be in good condition, with joints generally tight and surfaces undistorted and free of punctures. Air pollution and paint residue have darkened any exposed metal. Physical limitations prevented a complete examination of the gutter and the window casings, although the latter appeared sound. However, a few leaks at the base section--possibly the gutter--have been observed at the interior following a heavy rain. There is no evidence of recent leaks through the joint of the base and the upper drum cornice. The paint is dirty and mottled, particularly in the window enclosures and the cornice soffits. A total of 14 coats of paint have been identified on the dome base.

The dome proper appears to generally be in good condition except for a few fatigued joints where flanges are bent up at the edges of the lower semicircular terminals of the recessed panels. No leaks were observed through the body of the dome; the leak marks on the interior are many years old. The dome surface carries an interesting and attractive patina and has not been painted since its installation in 1947-48. To conclusively determine the condition of the entire dome, a thorough inspection using special scaffolding will be required.

The chemical reaction of air pollutants and water with the aluminum balustrade has darkened the balustrade and also caused severe discoloration of the copper at the vertical crown, where most of the paint has disappeared. The quarry tile walkway is in fair condition, but there are several missing or broken tiles and some weathering of sealant in the joints. At the walkway outer edge past the balustrade the exposed face of the concrete slab is in poor condition.

The dome structure consists basically of 24 curved wrought-iron ribs corresponding to the formed copper ribs and consoles at the copper exterior (see photo 68). These ribs spring from a cast-iron flat plate ring bolted to the top of the 3' thick masonry wall, at the dome base about 2' 6" below the portal windows. They curve up and inward below the crown, balustrade, and walkway, terminating in a cast-iron compression ring surrounding the oculus opening below the lantern. The curved ribs support 2" by 6" wood members, which carry wood sheathing covered with copper. From the compression ring ascend eight wrought-iron columns that support the lantern. All structural elements discussed here are in good to excellent condition.

The outer dome structure, as well as the inner dome and its decorative paintings, will be covered in detail in the phase III interior report.

## LANTERN

In terms of overall structural integrity, the lantern is in good condition. There is no evidence of recent leaks, either in the interior plaster surfaces or in the lantern dome. Leaks in the dome where the flagpole entered the gilded ball were apparently arrested by the weatherproof lead collar placed here during the 1971 installation of the new aluminum flagpole.

Aside from its very dark, dirty exterior, which is caused by severe reaction of the metal with atmospheric pollutants, the cast-aluminum balustrade from outside appears in good condition, with all plate sections firmly screwed in place and no sections missing, cracked, or broken. The condition of the interior should be checked by dismantling the balustrade and carefully examining the inner surfaces and the bracing members. The quarry tile walkway floor requires only minor treatment. The copper-covered roof scuttle is sound and watertight, although slightly dented.

The joints and seams of the copper covering at the base, the panels over the grid windows, and the entablature are flat and tight, with no signs of cracks or punctures. There is a considerable amount of paint buildup, and heavy dirt accumulation at the underside of the entablature and cornice. Thus, paint removal and thorough cleaning will be necessary to make a conclusive determination of the copper's condition. All but one of the casement windows and frames have been replaced, using a variety of glass types.

The cast-iron columns have a very rough surface resulting from accumulation of pollutants reacting with the iron and heavy paint buildup. Part of the top of one capital has broken off and is stored in the north basement. The missing acanthus leaves could be replaced, if desired, by making casts from the set of bolt-on units removed from the interior of one column and also stored in the north basement. There are no visible cracks in the columns, but this can only be established with certainty by removing the paint.

Likewise, the cast-iron window grids show no cracks, but they bear a heavy coating of paint and putty which has blurred the profiles. At least half the bull's-eye glass sections have been replaced, including several dozen in 1955. The grid sections are firmly bolted to the columns.

The exteriors of the dome, consoles, and sphere were not examined at close range, only from the gallery and through the telephoto camera lens.

Some of the pineapple-like plates are missing or dented. The dents were probably caused by the flagpole, which broke off in the 1870s. However, as previously noted, no leakage has occurred yet. Close inspection of these elements will be made when construction scaffolding is erected. A good percentage of the copper surface is dimpled by hail and slightly distorted from thermal stress.

Iron and wood framing and wood sheathing inside the lantern dome are solid and tight with no deterioration. An exception is the upper compression ring, which contains several small cracks, a result of shimming when the 1970 flagpole was installed. These cracks should not affect the ring's structural integrity. Further, because the cracks provided stress relief, they should not be repaired; otherwise, further damage would result.

The interesting question arises why the exterior copper panels between the column capitals were made with rounded openings covering the tops of the cast-iron grid windows instead of being made horizontal to align with the tops of the grids. Removal of the 1955 plaster and metal lath revealed early framing, which, from saw marks, cut nails, and traces of wood lath, would have been technically appropriate during the period 1870-95. The top of the early framing opening is round and coincides with the exterior opening in the copper.

According to early documents the lantern was enclosed by mid-January 1870. Also, the earliest known photograph showing the enclosures--with round-headed panels over the grids--may have been taken ca. 1880-85. An 1895 photo definitely shows round-headed panels.

The documentary evidence, confirmed by physical investigation, establishes that a flattened conical ceiling of copper, comprising eight tapered ribs radiating to each column head and covered with gilt paint, was installed as the original lantern ceiling in 1861. The question is, were flat-headed exterior panels, the bottoms aligned with the ceiling, installed at the tops of the east iron grid closures in 1869-70? If so, this would have been a clean, neat installation and a rational design treatment. Then, were these panels replaced by round-headed panels prior to 1885-95, or were the round-headed panels prior to 1885-95, or were the round-headed panels installed initially? In any case, it seems probable that the rounded panels were probably intended to match the round-headed upper drum windows.

Another interesting condition was discovered at the level of the column bases. This was an elaborate cast-iron ring structure giving lateral support to the structural columns and the remains of eight cast-iron drains. Other cutoff fragments inside the ring suggest that a cast-iron grid structure with glass in-filling, or oculus, spanned the now open space level with the column bases. This element could have been quite similar to the cast-iron glazed grids still in place below the lantern walkway. It would also serve the same purpose--a weatherproof covering that would admit light to the interior. This conclusion is reinforced by the fact that alterations around the casement windows suggest that they did not exist until quite a while after the lantern was completed or enclosed.

Changes discovered in the wood framing below the columns and around the casement windows suggest that the lantern base once had a different configuration from what appears today. Possibly, these changes were made when the round-headed panels were installed. Also, the sloping 2" copper drains over alternate casement windows, mentioned earlier and now nonfunctional, must have been part of a drainage system for the earlier base element.

A detailed description and analysis of the structural system and other features of the lantern will be provided in the phase III interior report.

# RECOMMENDATIONS FOR TREATMENT

## PAINT REMOVAL AND CLEANING

### General Discussion

The main objectives in removing paint from a structure like the old courthouse are obtaining a clean surface suitable for repainting, avoiding damage to the base material (or substrate), and accomplishing both at the lowest possible cost. Achieving these objectives is difficult because nearly all the available technical literature on cleaning buildings deals mainly with unpainted surfaces. Also, there is no one system or material that is satisfactory for all conditions; all methods have limitations or potential hazards depending on surface/substrate characteristics, building configuration, and environmental factors. This is particularly true with painted masonry because of the large areas involved and the general vulnerability of stone and brick. However, among the methods discussed below are several that are specifically applicable to particular elements of the courthouse.

As with all removal-cleaning methods, thorough testing should be conducted at inconspicuous locations and sample areas designated as a standard of quality for the final process. In addition, all work must be continually observed by a project supervisor experienced in masonry cleaning.

Removing paint from the various surfaces is essential for another reason besides preparing the substrates for effective repainting. Only by thorough removal can a conclusive determination be made of the required repairs and replacement to stone and mortar joints, copper, wood, and iron.

As determined by the project supervisor, tight, well-bonded, penetrating original paint primers in the stone can remain and be painted over.

Removal of this material would require further abrasive blasting, which might break the surface; a final chemical treatment might react adversely. For further information consult the conservation study by Frank Matero (NPS 1979).

Semipaste Chemical Strippers. These consist of two basic types--organic solvents containing a high percentage of methylene chloride, which are effective only on latex paints; and alkali strippers, which are effective on alkyd oil and lead oil paints. This method is time-consuming, usually requiring repeated applications followed by scraping, and in some cases scrubbing with a mild nontoxic detergent is necessary. Thus, the stripper method is practical for small areas only. The process can be speeded up by covering the treated area with polyethylene, which concentrates chemical action by retarding evaporation. This method used in small areas makes it easier to clean up and to protect the building compared to chemical methods requiring high-volume spray rinses. The supplemental use of heat devices, such as electric resistance plates, propane torches, and heat guns, is generally ineffective, and there is danger from fumes and stones may spall. The heat gun has the most successful record when carefully used, particularly on wood. Another tool that can be of limited use in conjunction with strippers is the rotary power brush, equipped with bronze or stainless steel elements to prevent discoloration. The cost of the semipaste stripper method is high, about $5 to $6 per square foot.

Chemicals with Water Spray Rinse. This method can be used in two ways: (1) liquid chemicals are applied in a water spray at 400 to 600 pounds per square inch (psi), followed by a hot spray rinse at 1,200 to 1,800 psi, or (2) an alkali gel is applied by brush followed by a hot spray rinse at 400 to 800 psi. In each case, repeated applications may be necessary to soften paint, with waiting periods in between; in the gel system, an overnight set may be necessary. Some materials can be an intermediate solution, combining an organic solvent with alkali. The gel system invariably uses potassium hydroxide as a prime ingredient. If used on limestone, chemical reactions with carbonates can occur, requiring an afterwash of mild acetic acid to prevent chemical erosion. The gel system is generally more effective on painted surfaces because of the mechanical loosening by brush action. This system was used effectively on the east facade of the White House in 1980 after thorough testing, with spray pressures up to 1,800 psi and a 3 percent acetic acid solution after wash followed by final rinsing to neutrality (ph 7). However, in this case the wall was composed chiefly of sandstone, which is not as susceptible to adverse chemical reaction. Chemical spray treatments are often successfully used on brick, a recent example being the Wainwright building a few blocks from the old courthouse. Like all water systems, the treatments cited have cleanup problems; also, there is the danger of water penetration into deeply eroded mortar joints. The cost is $5 to $6 per square foot for the liquid chemical method and $3 to $4 per square foot for the brush-applied gel method.

Water Jet. Pressures range from 400 to 10,000 psi. The water jet method can be effective at low pressure using hot water on unpainted masonry, particularly brick. Up to 2,000 psi this method is ineffective on painted stone; with higher pressures, damage to the stone usually occurs. The water jet technique, which employs a narrow orifice nozzle, is very different from the water spray mentioned above, which uses a conical orifice nozzle with a relatively wide dispersion. The cost for this method is $4.00 to $4.50 per square foot.

Abrasive Blasting. This method uses two systems of sandblasting--wet and dry. Both require careful attention to control factors such as pressure, grit size and type, nozzle orifice dimension and shape, time, and angle and distance of the nozzle to the surface. The wet system, known as wet aggregate or hydro-silica pump method, uses water and fine sand (no. 50 sieve) at pressures of 75 to 90 psi and can be effective and fairly safe in removing paint from stone. Slight erosion may occur, depending on the degree of attention to the factors cited and the skill of the operator. There is less of a building protection problem than with chemical spray methods. The cost for the wet system is $1.50 to $2.00 per square foot.

The dry sandblasting system has a significant advantage in cleanup over the wet system. Contrary to general opinion, it can be safely as well as effectively used to remove paint from sound stone, provided the control factors cited above are carefully followed. Paint removal with minor or no erosion of stone surface can be achieved using low pressures of 45 to 60 psi and extremely fine (no. 100 sieve), spherical "talc" sand, or other soft aggregates (such as walnut shells, see below). These factors slow the process; however, it is still faster than other effective methods, and thus the cost is lower--$1.00 to $1.25 per square foot. In some instances, drifting of the sand due to wind action can be a problem.

Abrasive Blasting with Organic Material. This method of blasting with organic materials is a relatively recent development. Crushed or milled walnut shells, pecans, peach pits, etc., are used. Because the particles are softer and larger than sand (no. 20-30 sieve), they can also be generally safer. Milled walnut shells are probably the most effective, removing paint from stone rapidly at 60 to 80 psi. However, this process is not as fast as sandblasting, which in addition to high price of the material, makes it expensive--$5.50-$6.00 per square foot. The materials are readily obtainable, and waste disposal is easier than with sand.

Glass Microspheres. Use of this material--tiny hollow glass beads averaging 100 microns in diameter--was developed by commercial airlines to clean exterior aluminum surfaces of airplanes. Subsequently, this method was found to be very effective in cleaning outdoor bronze sculptures, resulting in a polishing or burnishing rather than a scouring action because the microspheres are relatively soft. The microspheres can be effectively used on buildings to remove thin weathered paint or discolored films (caused by air pollutants) from copper. However, the system is ineffective on built-up paint layers on any surface. The microspheres are applied with the same equipment used for sandblasting.

## Masonry Surfaces

Limestone and Sandstone. The paint should generally be removed with a walnut shell abrasive blast at a pressure no greater than 80 psi. Some sections of sandstone, and possibly limestone too, are quite delicate and will require careful treatment at lower pressures. At other sections the sandstone has deteriorated to an exfoliated scale where blasting would only damage the stone beneath. At these areas, it will be necessary to gently remove the deteriorated stone with hand scrapers, taking care not to disturb sound stone. This technique will require close control and precise judgment by the project supervisor.

Pressures will have to be reduced on delicate areas with carved ornaments such as dentils, crown moldings, and modillions at the cornices and soffits. Much of the paint has vanished and the stone has eroded; however, heavy deposits of dirt and soot from airborne pollutants are found in many places. Where dirt and paint remains cannot be removed safely by low-pressure blasting, hand methods will be necessary, including scraping with plastic or stainless steel tools and brushing with stainless steel or bronze brushes. Power rotary brushes with stainless steel or bronze elements, used cautiously at low speeds, could be effective; however, this might not be practical because of the long extension bases necessary. The techniques described should be supplemented where necessary by scrubbing with a mild, nonionic detergent.

Pediments and chimneys are in sound condition, with little paint film remaining and some minor staining. Scraping, wire brushing, and possibly detergent scrubbing should be sufficient. Many of the chimneys contain new stone.

When walnut shell blasting is used, windows, doors, and copper must be protected. Precautions must also be taken to prevent waste buildup from clogging roof and areaway drains.

Brick. The total brick surface area is much smaller than the total stone surface area. Also, the paint film is somewhat thinner than on the stone and generally appears well-bonded and tight. Exceptions are a few small areas where paint has ruptured at the joints, possibly because of outward moisture migration through them.

Tests using the walnut shell abrasive blasting method have revealed that the brick varies in quality, especially in surface hardness. Even at low pressure, surface pitting has occurred in some cases, with complete paint removal.

Reducing the pressure further would not remove the paint effectively without long application and at very high cost.

Because the brick is relatively neutral or inert, it could be cleaned effectively and safely by the chemical spray treatment without the potential danger of adverse chemical reaction as with limestone. However, there is no practical way to keep the chemical wastes off the adjacent limestone pilasters, window surrounds, and basement walls.

In light of the above, it is recommended that the outer latex paint coat be removed by methylene chloride (organic solvent) stripper, followed by scraping and wire brushing until a solid, firm base for repainting is established. If the latter treatment is not sufficient, one or two coats of alkaline semipaste stripper should be applied, followed by final scraping and brushing.

Final Wash. When all paint removal and cleaning and all masonry repointing and repair have been accomplished, all masonry should be washed down--to remove blast residue, dust, and mortar film--with one of the following nonionic detergents in a solution no greater than 15 percent: Tergitol (Union Carbide), Triton (Rohm and Haas), or Igepal (G.A.F.). The spray should be at a low pressure, 10 to 20 psi, depending on conditions.

## Windows and Doors

All windows and basement doors are painted with semigloss black paint. The first floor doors are varnished and artificially oak-grained and require no removal work. Since the 1930s the graining has been done by the same St. Louis firm, Thikochek and Sons.

Basement, First, and Second Floors. All windows and basement doors were painted in 1975-77, and repairs were also made during that period. Some of the paint at sound windows should be removed to lessen buildup that obscures molding profiles and to prepare for repainting to the historic color if desired. At some first-and second-floor windows all paint will have to be removed to make necessary repairs; scaffolding will be needed for close-up inspection to conclusively determine where repair work is needed. Paint should be removed by careful application of heat guns followed by mechanical stripping, which would avoid the cleanup problems of chemical stripping.

Small Cornice Windows (24). There are 22 of these windows at the third floor of the north wing and 2 at the attic of the west wing. All the sash should be removed and the deteriorated paint completely removed by one or a combination of the methods previously described.

Upper Drum Double-Hung windows (24). A good deal of the paint has weathered off these units. All paint removal, necessary repairs, and repainting work will be done by the park maintenance staff.

Portal Windows at Dome Base (24). Initial investigation has revealed some deterioration in nearly all these bull's-eye windows; some may have to be replaced. All the windows should be taken out to safely and entirely remove the paint, either by the heat gun or other techniques, and to fully identify their condition.

Casement Windows at Lantern Base (8). Actually, there are only six sash at these openings, the other two having been removed for installation of electric exhaust fans at the east and west sides. No paint removal will be necessary on the sash, since it is recommended that they be replaced. Paint should be removed from all frames with semipaste stripper.

### Wrought Iron and Steel

The decorative railings at the east, north, and west porticoes and the south basement steps and the handrails at the cheek walls of the east steps are wrought iron. The curved grilles at the basement windows and at the first floor windows, south facade of the south wing, are steel. If these elements are to be repainted with the historic color, the same procedure should be followed as with the windows and doors in the basement, first, and second floors; that is, remove some of the paint with careful application of heat guns and follow with mechanical stripping.

### Cast Iron

The cast-iron columns at the upper drum and the lantern should be cleaned by the process of fine sandblasting at low pressure. The metal should be prime-painted soon after paint removal to prevent rust accumulation.

After removing the putty and glass from the cast-iron glazed grids at the lantern, the paint should be removed by fine sandblasting, as at the columns. Removal of heavy paint buildup will restore the crisp details of the iron and also provide perfectly cleaned surfaces for reglazing.

### Copper

Because of its large area, the base of the main dome should have its paint removed by a special alkali gel and hot water spray rinse. Paint on the copper at the lantern should be removed by alkaline semipaste stripper covered with polyethylene. In both cases, stubborn and hard-to-reach areas should be treated by glass microsphere blasting. The crown at the top of the main dome, which is discolored and has little paint remaining, can be cleaned by glass peening. In all cases some final touch-up with bronze brushes will be necessary. The best means of removing the dark streaks on the main dome, which resulted from chemical reaction of the aluminum balustrade with air pollutants, will be determined by a metal conservator, following careful examination and analysis, after scaffolding is erected.

## Aluminum Balustrade

Experiments with a chemical stripper indicated that the very heavy deposits of dirt and staining material could not be removed by this method. After consultation with Phoebe Weil, metal conservator, and her colleague Ray Lindberg, chief corrosion engineer of Reynolds Aluminum Company, it was determined that the aluminum could be safely cleaned by fine sandblasting at a very low pressure. This process was used in the last stage of original fabrication.

## Lantern Dome

Based on the limited view of the pineapple-like copper plates covering this element, most of the paint has weathered off, leaving a rough surface, apparently the result of reaction with airborne pollutants. The surfaces should be cleaned mechanically with the glass microsphere peening process.

## Gilded Sphere

A large percentage of the gold leaf has deteriorated due to the harsh environment since its application in 1942. In addition, after deterioration started, the sphere was given a coat of yellow paint, which dulled and mutilated the surface. Accordingly, the existing coating should be completely removed by an alkaline stripper, and the sphere should be regilded.

## Aluminum Flagpole

This element, which should be painted white for historical accuracy, was installed in 1971 and was anodized but not waxed, according to the manufacturer. Accordingly, Paul Campbell advised that the pole should be cleaned with a solvent solution such as toluene, followed by rubbing gently with "Scotch-Brite" plastic wool to lightly abrade the surface for good paint adhesion.

## Treatment after Repainting

After the building is repainted it should be cleaned annually to prevent buildup of deposits caused by air pollution, which would otherwise damage the paint and be difficult to remove after 10 to 12 years when repainting was necessary, thus requiring a major cleaning operation. Surfaces should be cleaned with a low-pressure water spray containing a mild solution of nonionic detergent such as Tergitol, Triton, or Igepal.

## MASONRY SURFACES

Mortar samples taken from stone and brick joints by Paul Brown of the National Bureau of Standards have been analyzed, and the following mortar formulation has been determined: three parts hydrated lime, one-half part portland cement, and five parts sand. Portland cement will be type II, white, nonstaining, and with prescribed limits on alkali to prevent efflorescence. The sand will be smooth, round riverbank sand to facilitate penetration into narrow joints and to be more workable with lime mortar. A limited amount of fly ash will be added with pressure grouting to ensure smooth flow into deeply eroded joints.

Precise methods, materials, and locations for repairing and replacing masonry can only be determined after all paint is removed and close inspection is made from the scaffolding.

### Lower Walls

Stone. The vertical and diagonal cracks appear to be dormant rather than active or overstressed. As stated earlier, the cracks are probably caused by early settlement, which has long since stabilized, and the irregular composition of the stone. Cracks ¼" wide or larger should be filled with sealant; smaller cracks should be filled with lime mortar containing fine sand and closely matching the existing mortar.

Joint mortar that is sound, hard, and tight should not be disturbed; loose, deteriorated mortar should be raked out and the joints repointed. In some places mortar has washed out as deep as 2'; where this occurs and where voids 4" or deeper occur, loose material should be cleaned out by compressed air and the joint filled to within 1" of the surface by pressure grouting, then pointed by hand.

An active or overstressed crack may exist at the cracked lintel over the tunnel door in the west wall of the north extension. If this is confirmed by close inspection and testing after paint is removed, tensile strength must be restored by replacing all or part of the stone with a new piece anchored by stainless steel rods embedded in epoxy.

It is vital that the above procedure and all stone work be executed by craftsmen highly skilled in historic stone restoration under the direction of a qualified contractor with extensive experience in similar work.

Brick. The mortar in the brick joints appears to be uniformly continuous, sound, and hard to a greater extent than much of the mortar in the stone joints. Loose mortar should be raked out and the joints repointed with lime mortar and tooled concave to match adjacent sound joints. Deeply eroded joints are not likely to be encountered, but if they are, they should be pressure grouted as described above. The small area of sandblasted brick in the west wall of the north extension is a minor blemish that would not be a serious visual intrusion after painting; no other damaged areas have been observed. Cracks should be filled as prescribed for stonework.

The existing mortar is the historic mortar as determined by extensive examination of mortar in various parts of the building; this was confirmed by National Bureau of Standards laboratory tests (using a mix of approximately one part lime to two parts sand) and by James S. Askins, senior restoration specialist with the National Park Service. There is no evidence from documentary sources or physical investigation of the joints that repointing was ever done prior to repointing of scattered, small areas with portland cement mortar by the National Park Service in the 1950s. This is consistent with the documented resistance or refusal of the authorities controlling the building until 1940 to spend money on exterior maintenance other than roof repairs and painting. Askins recommends a mortar consisting of three parts hydrated lime, one-half part white portland cement (type II), and five parts sand.

The "foreign" brick just above grade in the east portico front wall south of the steps should be removed and replaced by new limestone closely matching the adjacent existing stonework.

Granite Steps. The steps at the three entrance porticoes and at the south wing pavilion are in good to excellent condition and require no corrective work, only the continued good maintenance of the joints with high-quality sealant. Cracks and joints in the adjacent cheek walls should be treated as previously described.

## Porticoes

The porticoes, especially the lintels between the free-standing columns, must be closely examined on a section-by-section basis when scaffolding is erected. The lower portions contain several cracks on the vertical and bottom horizontal surfaces that might constitute a hazard to entering visitors. The conditions should be carefully analyzed in collaboration with a structural engineer, a reputable manufacturer, and a stone contractor, all experienced with epoxy reinforcement. If determined to be necessary, the cracks should then be cleaned out and filled by one of several methods, such as epoxy injection, epoxy gel, or epoxy grout, depending on the particular condition. Unstressed cracks should be filled with sealant. Mortar joints should be repointed and pressure grouted as described above.

There do not appear to be any deteriorated stones in the tympanums or pediment walls themselves. In 1961, the Klaric Contracting Company of St. Louis replaced 50 sections of deteriorated sloping pediment stones over the porticoes with Indiana limestone. All new and existing stones were connected with stainless steel clamps set in Dex-o-Tex, a durable traffic topping material.

## Cornices

At the principal cornice surmounting the lower walls, 22 pieces (averaging 6' in length) of the upper section, comprising the crown molding, were replaced in 1961 with Indiana limestone. Twelve pieces of the center section below, comprising the bed molding, were reset at the same time. One composite block extending the entire depth of the entablature and 9' long, at the east wall of the south extension, was replaced the same year by a monolithic block of new stone. All work was done by the Klaric Contracting Company. As noted elsewhere, a large piece of the main, or bottom, section fell from the north cornice of the east wing in 1975 (see photo 41).

All three components of the horizontal cornices and the raking cornices topping the pediments should be closely inspected block by block when scaffolding is erected and the paint removed. Particular attention must be given to the 1' 4" high bottom sections, which are cantilevered from the wall and support the small center bed mold and upper crown mold sections (see drawing 19).

Each section contains a number of defects, irregular in pattern and quantity, which are natural lines of separation, or "joints" in geological terms. Many of these occur at the horizontal cornices; however, from the limited inspection possible they are much less frequent at the raking cornices. Lines of separation are also lines of weakness because impact, frost action, and water erosion will cause failure at these joints. There are three types, ranging from minor to very serious, as described below:

1. Scattered, erratic joints at the top surface of the upper crown molding section; irregular joints at the parapet, most at the weather-rounded top surface, a few at the vertical face. These might also be called fissures and are not structurally serious as they are confined to the upper slab.

2. Horizontal lines of separation known as stylolites--or crow's-feet--irregular in shape, discontinuous, and occurring at the outer face of all three components but principally at the center and bottom components (see photo 39). These result from the intrusion of clay deposits in the horizontal bedding process during rock formation. They are of significant structural concern only at the bottom section where a piece might break off through failure at the joint (see drawing 19).

3. One or more vertical joints at the underside of the bottom section, running parallel to the outer face. At these lines of separation failure could occur, and a large piece of stone could fall from the cornice, which is exactly what happened in 1975 at the north side of the east wing (see photos 41 and 42).

A minor defect occurring at the top surface of the upper section consists of loose stone scale (see photo 40). This was caused by constant exposure and frost action since the last coat of paint (1963) wore off, or even as far back as the 1955 and 1942 paintings if indeed this surface was covered then. The condition should be corrected by simple cleaning and regular repainting as a minimum preservation treatment. To ensure more positive protection for this upper cornice area, it is recommended that a complete metal flashing cap be applied along the full length of all horizontal top cornices.

At all the stones where the condition in no. 3 occurs (see above), reinforcement should be provided by drilling through the stone and backup wall at one or more locations, depending on length of the block, and installing stainless steel bars embedded in epoxy, as shown on drawing 19. At the stones described in no. 2 above, the same procedure should be followed, if it is determined after careful inspection and analysis that conditions so warrant, such as the width, length, and condition of the stylolite and its vertical distance from the bottom of the sections. In both instances, allowance should be made for possible thermal movement.

Inspection of the cornices following paint removal should be conducted by a team thoroughly experienced in historic stone construction and consisting of an engineering geologist, a structural engineer, a stone masonry contractor, a historical architect, and a restoration specialist.

Unfortunately, many lines of separation and thus potential failure, not visible at the surface, may exist anywhere in the entire perimeter of the bottom cornice section. Therefore, the only way to determine the interior stone conditions with any degree of certainty would be to make a comprehensive investigation with advanced scientific instruments.

One applicable system detects voids and cracks by means of microwave, or radar signals. This method has been successfully used by the Electromagnetic Fields Division of the National Bureau of Standards, Boulder, Colorado, headed by Doyle A. Ellersbruch. They have also tested this technique on the Mission Church at Tumacacori National Monument with Anthony Crosby, project historical architect, Denver Service Center. Some specialized engineering firms offer commercial radar systems easily portable for field use: One such firm, Geophysical Survey Systems of Hudson, New Hampshire, demonstrated their device in November 1979 at the Charlestown Navy Yard, Boston National Historical Park. A representative of Hugh C. Miller, chief historical architect of the National Park Service, witnessed this demonstration.

A second method detects voids and cracks by ultrasonic pulse measurements. This method has been extensively developed in Europe, particularly France, and is commonly used by engineering laboratories in the United States. James Clifton, National Bureau of Standards, Washington, D.C., is familiar with this technique; he and an assistant tested one type of equipment at the old courthouse in October 1978 and determined that the method was basically feasible, with good potential for testing of the cornices.

These techniques are by no means infallible; however, they can indicate generally which areas should be of principal concern. Also, they are the only methods known which could come near a definitive indication of where failures might occur. Some destructive testing, i.e., drilling for cores, will probably be necessary to correlate precise crack conditions in the interior of the stone with data recorded graphically by instruments. It is recommended that these methods be considered. If the decision is made to use one of them, the work should be coordinated with a construction contract for the lower wall rehabilitation so that the same scaffolding could be used.

The only way to ensure that the entire cornice would be permanently safe would be to remove it completely and replace it by one of two methods. In the first method, a replica could be installed, consisting of a metal armature supporting a composite stone particle-epoxy exterior surface integrally molded to an inner glass fiber reinforcing element. It is recommended that this method not even be considered because the drastic change to a completely foreign material would constitute an extremely adverse effect.

The second method, replacing the old cornice with new Indiana limestone, would also produce an adverse effect. However, it could be justified because it would preserve the building with a stone resembling as closely as practicable the original material. It is not recommended that this method be followed because of the loss of historic fabric and because the cost would be great--over $1,500,000.

The scattered joints or lines of separation at the top surface of the upper section and at the top of the parapet are too thin to be filled with sealant; as a minimum protection instead, they should be carefully covered with a durable traffic topping such as Dex-O-Tex. Lead caps now set in sealant at the construction joints between slabs should be checked, resealed, and reset as necessary; new caps should be installed at joints where they are missing. Because of the very severe exposure affecting the top surface of the cornice and the parapet, it is recommended that they be repainted on a more frequent cyclic schedule than will be necessary for the building in general.

To ensure complete and lasting protection of the top of the horizontal cornices from the constant exposure to the elements and frost action, a complete flashing cover is proposed to keep these areas protected. This would eliminate the damage that would occur when the sealant, lead caps, and/or paint began to weather with the minimal treatment.

There are approximately 12 sections of crown molding, ranging from 12" to 24" long, which have spalled off; these should be replaced by new Indiana limestone pieces set in epoxy adhesive and doweled into adjacent sound stone. Small spalled sections and chips--about 25--should be accepted as inevitable weathering loss, given the quality of the stone, and mortar joints should be merely repointed or, in some cases, filled with sealant.

As a matter of note, the rehabilitation work proposed in this report includes only the upper parts of the building and the lower walls to basement level or grade and the entrance steps. It does not include areaway paving or steps or the retaining walls. These elements will be treated in a future phase IV report.

## Stone Drums

Lower (Octagonal) Drum. It is suspected that this component contains many sandstone blocks, similar to those already exposed, with deteriorated surfaces that are exfoliated and scaling off. Initial treatment should include carefully removing this material to sound stone. (Limestone should be treated similarly if the same condition occurs.) The roughened surface should be repainted. Entire or partial blocks should be replaced only if a serious structural failure occurs and the blocks fall out; this does not appear likely. There are numerous deeply eroded joints that should be thoroughly cleaned out, pressure grouted, and repainted. General repointing is needed elsewhere. There appear to be no cracks; if they are found after paint removal, they should be filled with sealant as prescribed earlier.

The joints at the top surface of the cornice and of the transition ledge to the base of the upper drum should be filled with sealant; at the latter, joints should be covered with lead caps. It is also recommended that these surfaces be repainted at more frequent intervals than the rest of the building because of their extreme exposure.

Upper (Circular) Drum. There is little apparent evidence of mortar joint deterioration except at the keystones over the windows and at the underside, or soffit, of the cornice. No overstressing is evident. Soffit joints should be filled with sealant, others repointed or pressure grouted as indicated. The critical joint at the ledge and the wall below the windows should be carefully inspected after paint removal, deteriorated sealant and mortar raked out, and the joint sealed. The latter treatment should also be done at the transverse joints between the stone blocks of the ledge, and lead caps should be installed.

The horizontal cracks in the soffits of the architrave blocks, which in some cases extend vertically up the face of the architrave and into the frieze, do not appear active or overstressed. They probably occurred over a century ago during initial settlement and were possibly aggravated by the 1968 earthquake. Filling with sealant, or with mortar if too small for sealant application, should be sufficient; if close examination reveals excessive stress, they should be treated with one of the epoxy methods prescribed earlier for the porticoes.

There are five missing or badly deteriorated carved stone modillions at the cornice soffit which should be replaced by hand-carved pieces of new Indiana limestone. They could be copied from a modillion that fell from the cornice but which is still intact. Additional support should be provided by thin stainless steel rods at each side. These could be replaced by fiberglass units, which would cost only one-third as much as stone; however, it is recommended that this alternative not be considered because this introduction of foreign material would constitute an unjustifiable adverse effect.

The crown molding of the top cornice is eroded and contains a few minor spalled and chipped areas, all within the category of normal wear and tear. After close inspection, it may be found that some of these sections, say 12" long, should be cut out and replaced, as described earlier for the main cornices. Similar replacement may be necessary also at the small cornice below the columns. (A few sections may also need to be replaced at the lower drum cornice.)

The upper slab (crown molding section) should be carefully inspected to determine what pieces are displaced or loose. These should be leveled and missing bed mortar replaced by pressure grouting. At cracks all mortar and old sealant should be raked out, the voids backpointed, and the upper portion sealed. The same treatment should be applied at transverse joints between slab sections, and lead caps should be installed.

Top surfaces of the cornices should be kept painted to prevent erosion from weathering. New sealant should be applied at the joint between the top of the upper cornice and the copper base of the dome.

Copper Downspouts. The downspouts descend from the gutter of the main dome past the two drums to the wing roofs. They are included in this discussion because they are physically attached to the drums. The four downspouts appear to have been installed with the 1947-48 copper reroofing of the dome. While complete removal of paint would be required to determine their exact composition, the downspouts are probably somewhat deteriorated. It is recommended that they be replaced by lead-coated copper for increased durability. The cost would be small.

## CAST-IRON COLUMNS - UPPER DRUM

Cracks and holes should be filled with steel-epoxy compound. Any cracked capitals should be reinforced with countersunk machine screws. The tops of capitals that extend beyond the architrave, and the stone bases at the joint with the stone ledge, should be sealed. Evidence has been found during paint analysis by Frank Matero that sand was introduced in the first finish coat during the original painting of the columns. Presumably this was done to simulate the texture of stone columns. It is recommended that sand not be added in the repainting of the columns; the cost would be higher, and there would be little or no difference in appearance when viewed from street level.

An administrative decision by the Midwest Regional Office has been made to not reproduce the missing acanthus leaf decoration on the columns of the upper drum and lantern. If replacement was ever desired, a research project should be initiated to obtain design data necessary to reproduce the missing bolt-on acanthus leaf ornaments at the column capitals. Accurate data would have to be obtained from original photographic negatives of the old courthouse, which might exist in the courthouse archives, in the archives of the Missouri Historical Society, or in a similar institution. From these negatives the design details might be retrieved by a technique known as image enhancement or intensification, which has been extensively developed by the National Aeronautics and Space Administration at its Marshall Space Flight Center in Alabama. The cost of this work may range from $2,000 to $4,000, depending on how many photographs are used. There are four that would probably be most useful. Assuming the missing ornament was similar to the existing cast-iron ornament on the interior column capitals at the same level, each column capital would contain 50 to 60 separate pieces in seven to nine different designs. Reproduction would be expensive, about $35,000 to $40,000 for ornament alone. If physical reproduction was not possible, the photographic record, if obtainable, would be a valuable and interesting addition to the old courthouse archives.

## COPPER DOME

A very close examination must be made of the lower part of the dome proper (including recessed panels and plinths), the gutter, the dome base (including consoles and plinths), and the joints of the circular window sash with copper surrounds. This is the area where leaks have occurred in recent years.

At the base, all loose copper connections between the walls and the window casings should be refastened, old sealant removed, and connections resealed. Deteriorated pieces of copper at the gutter and elsewhere should be replaced; loose seams soldered; joints repaired, riveted, and sealed; holes patched; and expansion joints reset.

The entire dome surface should be methodically inspected, and essential repairs and replacements should be made as above. Soldering and other intrusive treatment should be avoided as much as possible, bearing in mind that such work cannot be concealed by paint like the base, since the dome surface will remain natural weathered copper.

At the vertical crown below the lantern walkway, the exposed, deteriorated edge of the concrete slab should be consolidated with epoxy grout. Then it should be covered with a new copper cap flashing extending well under the quarry tile walkway flooring.

All 24 bull's-eye window sash and glass should be removed. Deteriorated sections of sash should be replaced, salvageable material repaired, and the glass reset with glazing compound. After reinstalling sash, sealant should be applied except at the sash at the northeast stair.

## LANTERN

The cast-aluminum balustrade should be disassembled, internal reinforcing members repaired, and corroded or missing fasteners replaced. Interior surfaces should be painted to prevent discoloration from atmospheric pollution. After reinstallation of the balustrade, the exterior should be painted.

Missing or broken quarry tile should be replaced, loose pieces reset, deteriorated joints cleaned out, and new cement applied.

Six casement window sash at the base should be removed and replaced with new sash glazed with heat-resistant glass and weather-stripped. The wood should be treated with water repellent and preservative, and frames repaired.

All glass at cast-iron glazed grids should be removed but saved. After sandblasting, new heat-resistant ¼" glass should be installed. Holes and cracks in cast iron should be filled with steel-epoxy compound, and sealant applied around the perimeters of all units.

Cast-iron columns should be repaired with steel-epoxy compound, and the missing or broken bolts at jambs should be replaced. The missing Corinthian capital leaves will not be replaced.

At all copper surfaces except the dome and elongated sphere, loose or defective seams and joints should be repaired or reset and soldered or riveted as required. Deteriorated metal should be replaced, holes patched, sealant applied, and missing fasteners replaced. If gilding at the elongated sphere is beyond salvage, it should be removed, necessary repairs made, and the sphere covered with 23-karat gold leaf. The lead collar where the flagpole penetrates the sphere should be repaired or replaced.

The damaged or deteriorated pineapple-like plates of the dome should be replaced, while ensuring that all other plates are fastened securely.

The truck at the top of the flagpole should be replaced with a heavy duty model, and new accessories and halyard should be installed. A new 8" aluminum ball covered with 23-karat gold leaf--to replace the missing finial at the top of the flagpole--and a new 8' by 12' flag should be installed.

## DOORS AND WINDOWS

The artificially grained oak doors at the first-floor entrances are in good to excellent condition and require no work. Some of the cellar doors need repairs, refitting, and adjustments to hardware.

Repairs made to date on windows have been temporary. The sills and lower trim were covered with a fiberglass matt and a material called Tuff Cote to repair rot. This material is not removable and did not consolidate the original material below; consequently, the rotting condition will continue. Because rot at the sills and lower trim is pervasive on many of the 238 windows, replacement of these items is recommended. Following paint removal, the entire exterior frame, sash, and trim should be fully examined to determine deteriorated elements. On the windows at the transverse halls this may require partial disassembly to evaluate their condition. New replacement sills, window sash, or individual members or portions of them should match the removed material in design, size, and profile. In addition, cracked glass, missing sash chain, weights, and pulleys should be replaced as necessary.

All of the air conditioners have been removed on the first floor except for those in the procurement and interpretive offices. Although the remaining air conditioners are intrusive to the exterior appearance of the building, they are necessary to the comfort of the staff. Therefore, the elimination of these features cannot be accomplished without the installation of a central air-conditioning system. The information related to installation of such a system is to be covered in the phase III interior report. Where window sash have been modified to accept air conditioners, vents, grilles, and louvers, and these items are no longer in place or needed, the sash should be repaired.

When construction scaffolding is erected, the exteriors of all attic and third-floor windows (west and north wings) and shutters should be inspected. Deteriorated units should be repaired or replaced.

Weather-stripping should be installed at doors and windows and sealant applied at door and window frames at all the above locations where these materials have not already been installed.

All removal, repair, reglazing, and reinstallation of the 24 round-headed double-hung windows at the upper drum will be done by the park maintenance staff. Paint removal and repainting will be included.

While it is not contemplated that the upper drum windows with clear glass substituted for previously broken etched glass will be replaced due to cost, the following discussion describes the process used in the original manufacture and the possible restoration method should this work ever be desired.

The process by which these glass windows were probably made was an acid technique. Through time artisans have developed a vast array of etching and frosting techniques. The difference between etching and frosting is the clarity of the finish. Various acids used on the glass actually dissolved away some of the surface material. The degree of texture (coarseness of the finish) and degree of frost (the clarity of the glass from clear to almost opaque white) depend on the type and strength of acid(s) used, exposure time, working temperature, and glass type. It is even possible to polish and clarify an etched glass surface by using acid to smooth out the texture. A technique such as this was used on the courthouse windows to create the nearly clear border around the frosted portions of the design.

The original glass was likely a high quality, hand-blown, ground, and polished glass; therefore, duplicating it would be extremely expensive. A modern alternative such as ¼" thick plate float glass could be substituted. Because the chemical composition of the glass would be different from the original, the reaction of the acid processes would not be the same. Creating the same appearance as the original would take experimentation.

A photographic mask could be made to adhere to the glass to protect it at those areas in which work was not to take place. An even frost over the whole glass light except in areas to remain clear could be achieved either by acid or by sandblasting. Sandblasting with modern equipment and careful work could rival acid etchings. Under a microscope the original glass could be studied to determine the exact texture of the frost. Using an appropriate size sand grain, air pressure, and nozzle, a close match in texture could be made.

The next step would be to acid-polish the design onto the glass. This technique would reveal the pattern against a frosted background. Once the mask was applied, the glass could be dipped into the bath. This process, although it would not take long to dip, would require a lot of preparation time and would be extremely dangerous due to the strong acids used. Cleaning the masks off with thinner would be the final step.

Acid etching is a rarely practiced process in glassworks today largely because of the difficulties and danger of working with the acids. Therefore, the cost to reproduce glass using this process would be high, approximately $18,000 for the 23 missing panes. This would include all the artwork and production of the finished glass. Installation of the glass in the wood sash and repainting the sash and trim would add another $4,000 to the cost.

## PAINTING AND COLOR CHRONOLOGY

The earliest modern account in any detail of the courthouse exterior painting appears in a memorandum dated April 21, 1941, from Charles E. Peterson, NPS architect. In it he mentions a September 30, 1863, report by architect William Rumbold recommending that the building exterior be painted. Peterson next refers to and quotes from the painting contract with Wilgus and Kitchem of October 19, 1863. Finally, Peterson recommends that original colors be ascertained by removal of later coats, and also that the copper dome (probably original) and the 1941 lead-coated copper roofing at the wing roofs be painted light green to simulate weathered copper roofing.

In an April 30, 1942, memorandum to the superintendent, Ralph W. Emerson, NPS architect, set forth a complete list of paint colors. From the precise mixes included, it is possible that some physical investigation of early paint coats had been done; however, no documentation of this has been found. Emerson's recommendations for "colors . . . as proposed in conference April 25, 1942" were reproduced in the June 8, 1942, specifications for exterior painting (contract no. I-1P-17968) and are listed below:

stone lower walls, columns, cornices, and porticoes - field gray
brick - warm gray
drums (including cast-iron columns) - field gray
base and crown of main dome - field gray
main dome - patina green

lantern balustrade and base - field gray
lantern (including cast-iron columns and grids) - field gray
lantern dome - patina green
sphere above lantern dome - gold leaf
flagpole shaft - white
finial at top of flagpole shaft - gold leaf
door and window frames and trim - white
window sash - bronze green
basement doors - bronze green
portico railings - bronze

The specifications excluded painting the lead-coated copper roofs, entrance doors and frames (which were "recently grained"), and "all recently painted window sash", referring to the large number of new 6-over-6-light sash installed in 1942 at all three floors. Window guards were neither included nor excluded; instead, they were "to be removed" along with miscellaneous other exterior metal elements. This was probably done because the 1942 guards were replacements, the guards from the 1862-70 main historic period having been removed at various times during the late 19th century or in 1907 when very extensive alterations and replacements at the basement walls and areaways were carried out. Accordingly, the window guards were not included in the analysis for the color chronology. The 1863 contract and specification included the following schedule:

stone and brick lower walls, columns, stone cornices, and
  porticoes - white
drums (including cast-iron columns) - white
base (attic story) of main dome - white
lantern balustrade and base - white
lantern (including cast-iron columns) - white
"necking" or scrolls and rings - white
sphere above lantern dome - gilded
window frames - white
window sash - bronze green
portico railings - bronze paint
entrance doors and frames - varnished and grained

Significantly, no mention was made of the main dome, lantern dome, basement doors, or flagpole. According to the contract, the exterior painting was to be completed by June 24, 1864. It should be noted that the cast-iron glazed grids at the lantern did not exist at this time.

The field gray color mentioned in the 1942 contract supposedly consisted of 48 parts of white lead to one part Turkey umber, a proportion that probably would have yielded a very light color, an off-white perhaps resembling the dingy white mentioned by the building custodian in 1867. The warm gray color prescribed for the brick in 1942 was supposed to have contained 20 parts white lead to one part raw Turkey umber. This difference may have resulted from the brick having been painted earlier than the stone, and thus having become darker through more dirt accumulation. Also, it may be possible that the paint on the brick darkened because of a different chemical reaction from that on the stone.

Initial investigation for this report revealed a yellow tint used as the earliest coat at the lower drum. This evidence is suggestive of the 1863 contract, third paragraph: "and if it should be desired to have a yellow or other tint in said paint." However, the National Bureau of Standards analysis determined that this color was actually the result of decomposed or oxidized white lead pigment.

The lower drum is one of the earliest portions of the building, having been completed by 1843. Similarly, a reddish color was identified as the earliest color at one location in the west wing, also largely completed (except for the portico) by 1843. It is possible that this color was the result of iron oxide staining.

An off-white, or ivory, was discovered to be the earliest coat at the north wing, which was completed in 1861. This treatment may very well have been part of the 1863-64 painting.

In light of the rather offhand, casual way the justices treated their building, it seems quite possible that different portions of the courthouse were painted different colors or left unpainted between very early 1852 when the new wings were started, and say, December 1861 when the exterior was essentially completed. This condition may well have continued until the overall painting of 1863-64.

Conjecturally, it seems likely that the 1863-64 painting was done both to unify the disparate parts of the courthouse and to glorify it by creating the illusion of a very light-colored marble or granite building. This would be similar to the scoring of the wood siding and painting with sand paint done at Mount Vernon by George Washington to create the illusion of cut stone.

The 1863 painting specification indicates clearly that neither the main copper dome nor the lantern dome was to be painted. Accordingly, it is unnecessary, as originally contemplated, to remove and possibly mutilate a portion of the 1948 copper to determine if the original dome was painted. However, the pineapple leaves on the lantern dome will be analyzed to determine if painting was done before 1942.

Ideally, the exterior paint, especially at the stone and brick masonry, should be a weathering or "chalking" type resembling the original white lead paste and boiled linseed oil paint. This type would more closely approximate the historical appearance, better reveal the masonry textures, and produce less of a filmy look than acrylic latex paint. Paul Campbell of the National Bureau of Standards has determined that alkyd oil finish paint would resemble the original and allow moisture passage; latex primer should be used, which would also permit moisture migration and is strongly resistant to the alkalis in masonry.

In the Munsell color system, on which the accompanying color chronology is based, colors are defined by hue, or the basic color; value, the lightness or darkness of the color; and chroma, the richness or grayness (neutrality) of the color. For example, Munsell color no. 5Y 9/1, the color recommended for most of the surfaces as discussed below, is a medium hue yellow; 2.5Y would be toward the yellow-red series, and 10Y would be toward the green-yellow series. The figure 9 represents the light value on a scale of 1 to 9, with 9 being the lightest. The figure 1 represents the chroma on a scale of 1 to 18, with 18 being the richest and 1 being the most neutral, or most gray. Thus, the color 5Y 9/1, being the lightest in value and most neutral in chroma for its hue, could be described as off-white or ivory.

The black to white range, being simply dark to light, is represented by the prefix N, black being 5/ and white--actually a very-near white--being N9.5/.

The other principal color recommended, Munsell color no. 2.5G 2/4, is a rich dark green. The 2.5G number, which is toward the green-yellow series, is appropriate because this more emphatically suggests the bronze green color for the window sash, which was called for in the specifications.

It is apparent from the color chronology that a very near white--N9.5/ or N9.25/--was used for the original exterior painting of the old courthouse as prescribed in the 1863 specification. It is equally obvious that white soon turned to ivory or cream--5Y 9/1, 5Y 9/2--dirty yellow, deep yellow-gray, dark brown, and finally black. The latter in some cases, viewed microscopically, is a glossy material resembling pure carbon. This pattern was due to the extreme air pollution, mainly from soft coal, which plagued St. Louis throughout the building's history until passage in 1941 of a smoke abatement ordinance. In these conditions the original white paint, and later white coats if used, would start turning darker almost immediately after application.

Since this evaluation characterizes the color appearance of the building throughout its history, it would be appropriate to repaint it an off-white, or very neutral, extremely light yellow-gray rather than white as originally used. Accordingly, it is recommended that Munsell color no. 5Y 9/1 be used for the white areas described in the 1863 specification, and for the white, field gray, and warm gray areas described in the 1942 specification. An exception to the latter is the flagpole shaft, which should be painted white. The main dome and the lantern dome should not be painted.

Analysis of the windows and of the cast-iron elements at the lantern is more complex. Most if not all of the basement, first-floor, second-floor, and upper drum windows, and possibly the frames as well have probably been replaced. The bull's-eye windows at the dome base are very possibly original, based on the deterioration observed and also on the fact that the very difficult access would make removal unlikely. In some cases the appearance of a dark green color such as 7.5G 2/4 or 7.5G 3/4, which are close to the 2.5G 2/4 color previously mentioned, may have been the assessment by the replacer of the early color existing on the discarded window. It can also be noted that in the lantern casement windows, where most of the sash are quite recent replacements, one or both of the 7.5G colors appear on the frames, which might be original or at least very old.

The most positive evidence appears in the cast-iron glazed grids at the lantern, which were installed by early January 1870 and unlikely to have been replaced. At this location 2.5G 2/4 is the original color. This evidence is possibly reinforced by the first two colors on the lantern cast-iron columns. The original color is white, N9.5/, which would fit with the lantern color prescribed in the 1863 specification. It is also apparent in the earliest known photograph (ca. 1868) of the completed courthouse that at least a light color, certainly not a dark green, was used on the columns. It seems likely, therefore, that the columns were painted 2.5G 2/4 after 1870 to relate the two sets of cast-iron elements.

In light of the foregoing, it is recommended that all the window sash and the cast-iron glazed grids be painted Munsell color no. 2.5G 2/4, which could also be taken as a reasonable interpretation of bronze green.

Paul Campbell (NBS) has recommended that the flagpole be painted with a special coating proven to be compatible with and effective on aluminum. It is very durable, hard-surfaced, and highly resistant to extreme heat and cold. The coating consists of a two-part epoxy primer and two finish coats of an aliphatic urethane.

It is recommended that a white color of this coating be used. The nature of the material is such that it is virtually impossible to satisfactorily blend it to match another color. Also, the use of white, while a small departure from the general scheme, would be an appropriate recall of the fleeting periods in the evolution of the old courthouse when it bore this color.

Following removal of the deteriorated paint and gold leaf from the elongated sphere below the flagpole and necessary repairs to the copper, additional surface preparation will be required. This will consist of vigorous scrubbing with trisodium phosphate to remove all residue, thorough rinsing, and mild abrasion with 3M Scotch-Brite plastic pads. The gilder will then do a final application of mild acid wash and priming before sizing and gilding.

As the chronology shows, the tenth paint layer of the wrought-iron railing at the east portico is actually a metallic particle coating intended to reproduce the original bronze paint applied in 1864. It is suggested that the later coats be removed from all railings and that this metallic bronze paint be exposed and restored, leaving the original bronze 1864 paint preserved beneath. This procedure would be a fitting way to preserve and commemorate the 1942 first painting by the National Park Service on original elements of the old courthouse.

## PAINT COLOR CHRONOLOGY

### Stone - Lower Walls

East Portico

| Layer | Munsell No. | Color |
|---|---|---|
| 1 | N9.25/ | Off-white |
| 2 | 5Y 7/1 | Light/medium gray-yellow |
| 3 | 5Y 9/2 | Cream |
| 4 | N4.0/ | Dark gray |
| 5 | 10Y 6/1 | Medium gray-green |
| 6 | 10YR 8/4 | Light yellow-tan |
| 7 | 10Y 7/1 | Medium gray-brown |
| 8 | N8.5/ | Very light gray |
| 9 | N8.5/ | Very light gray |

### West Portico

| Layer | Munsell No. | Color |
|---|---|---|
| 1 | N9.25/ | Off-white |
| 2 | 10YR 8/4 | Light yellow-tan |
| 3 | 5Y 7/1 | Light/medium gray-yellow |
| 4 | 10Y 5/1 | Medium/dark gray-green |
| 5 | 10Y 6/1 | Medium gray-green |
| 6 | 10Y 7/1 | Medium gray-brown |
| 7 | 10Y 7/1 | Medium gray-brown |
| 8 | N8.0/ | Very light gray |
| 9 | N8.5/ | Very light gray |

### North Portico

|  |  |  |
|---|---|---|
| 1 | N9.5/ | Near-white |
| 2 | N7.5/ | Light gray |
| 3 | 5Y 9/2 | Cream |
| 4 | 10Y 5/1 | Medium/dark gray-green |
| 5 | 10Y 6/1 | Medium gray-green |
| 6 | 2.5Y 6/2 | Medium gray-brown |
| 7 | 10Y 7/1 | Medium gray-brown |
| 8 | N8.5/ | Very light gray |
| 9 | 5Y 8/1 | Very light yellow-gray |

### South Portico

|  |  |  |
|---|---|---|
| 1 | N9.5/ | Near white |
| 2 | 5Y 7/1 | Light/medium gray-yellow |
| 3 | 5Y 9/2 | Cream |
| 4 | 10Y 5/1 | Medium/dark gray-green |
| 5 | 10Y 6/1 | Medium gray-green |
| 6 | 10Y 7/1 | Medium gray-brown |
| 7 | N8.75/ | Very light gray |
| 8 | N8.75/ | Very light gray |

## Brick - Extension Walls

### East

|  |  |  |
|---|---|---|
| 1 | N9.5/ | Near-white |
| 2 | 10YR 8/4 | Light yellow-tan |
| 3 | N2.0/ | Near-black |
| 4 | N8.5/ | Very light gray |
| 5 | N2.5/ | Very dark gray |
| 6 | 10Y 6/1 | Medium gray-green |
| 7 | N5.5/ | Medium gray |
| 8 | N8.0/ | Very light gray |

### West

| Layer | Munsell No. | Color |
|---|---|---|
| 1 | N9.25/ | Off-white |
| 2 | 5Y 9/2 | Cream |
| 3 | N2.5/ | Very dark gray |
| 4 | 5Y 9/1 | Ivory |
| 5 | N3.0/ | Very dark gray |
| 6 | 10Y 5/1 | Medium/dark gray-green |
| 7 | 5Y 7/1 | Light/medium gray-yellow |
| 8 | N8.5/ | Very light gray |

### North

| | | |
|---|---|---|
| 1 | N9.25/ | Off-white |
| 2 | 5Y 7/3 | Medium/light gray-yellow |
| 3 | N2.5/ | Very dark gray |
| 4 | 7.5YR 5/4 | Medium gray-brown |
| 5 | N3.5/ | Dark gray |
| 6 | 10Y 7/2 | Medium/light gray-green |
| 7 | N7.0/0 | Light gray |
| 8 | N8.5/0 | Very light gray |

### South

| | | |
|---|---|---|
| 1 | N9.5/ | Near-white |
| 2 | 2.5Y 6/2 | Medum gray-brown |
| 3 | N2.0/ | Near-black |
| 4 | N8.0/ | Very light gray |
| 5 | N1.5/ | Near-black |
| 6 | 10Y 5/1 | Medium/dark gray-green |
| 7 | 10Y 7/1 | Medium/light gray-green |
| 8 | N8.25/ | Very light gray |

## Stone - Lower Drum

### East

| | | |
|---|---|---|
| 1 | N9.5/ | Near-white |
| 2 | 5Y 9/3 | Cream-yellow |
| 3 | N2.5/ | Very dark gray |
| 4 | N8.5/ | Very light gray |
| 5 | N2.0/ | Near black |
| 6 | 5Y 9/1 | Ivory |
| 7 | N1.5/ | Near-black |
| 8 | 5Y 9/1 | Ivory |
| 9 | N8.5/ | Very light gray |

### West

| Layer | Munsell No. | Color |
|---|---|---|
| 1 | N9.5/ | Near-white |

## Stone - Lower Drum

### East

| | | |
|---|---|---|
| 1 | N9.5/ | Near-white |
| 2 | 5Y 9/3 | Cream-yellow |
| 3 | N2.5/ | Very dark gray |
| 4 | N8.5/ | Very light gray |
| 5 | N2.0/ | Near black |
| 6 | 5Y 9.1 | Ivory |
| 7 | N1.5/ | Near-black |
| 8 | 5Y 9/1 | Ivory |
| 9 | N8.5/ | Very light gray |

### West

| | | |
|---|---|---|
| 1 | N9.5/ | Near-white |
| 2 | 5Y 9/2 | Cream |
| 3 | N1.5/ | Near-black |
| 4 | 10Y 5/1 | Medium/dark gray-green |
| 5 | N1.5/ | Near-black |
| 6 | 10Y 7/1 | Medium/light gray-green |
| 7 | N2.0/ | Near-black |
| 8 | N7.5/ | Light gray |
| 9 | 10Y 7/1 | Medium/light gray-green |
| 10 | N8.5/ | Very light gray |

### North

| | | |
|---|---|---|
| 1 | N9.25/ | Off-white |
| 2 | 5Y9/4 | Cream-yellow |
| 3 | N2.0/ | Near-black |
| 4 | 5Y 9/1 | Ivory |
| 5 | N2.5/ | Very dark gray |
| 6 | 5Y 7/1 | Medium/light gray |
| 7 | N3.0/ | Very dark gray |
| 8 | N7.5/ | Light gray |
| 9 | N8.25/ | Very light gray |

### South

| Layer | Munsell No. | Color |
|---|---|---|
| 1 | N9.5/ | Near-white |
| 2 | 7.5Y 9/2 | Very light gray-yellow |
| 3 | N1.5/ | Near-black |
| 4 | 5Y 9/2 | Cream |
| 5 | N1.5/ | Near-black |
| 6 | N8.5/ | Very light gray |
| 7 | N2.5/ | Very dark gray |
| 8 | 5Y 9/1 | Ivory |
| 9 | N8.5/ | Very light gray |

### Base of Dome
(Painted Copper)

| | | |
|---|---|---|
| 1 | N9.5/ | Near-white |
| 2 | 5Y 9/1 | Ivory |
| 3 | N2.0/ | Near-black |
| 4 | N8.5/ | Very light gray |
| 5 | N1.5/ | Near-black |
| 6 | N9.0/ | Off-white |
| 7 | 10Y 8.5/1 | Light gray-yellow |
| 8 | N2.5/ | Very dark gray |
| 9 | N9.25/ | Off-white |
| 10 | N8.5/ | Very light gray |

### Cast-Iron Glazed Grids - Lantern

| | | |
|---|---|---|
| 1 | 2.5G 2/4 | Very dark green |
| 2 | N1.25/ | Near-black |
| 3 | N2.5/ | Very dark gray |

### Base of Lantern
(Painted Copper)

| | | |
|---|---|---|
| 1 | 10Y 9/1 | Very light gray-yellow |
| 2 | N5.25/ | Medium gray |
| 3 | 2.5Y 6/4 | Medium gray-brown |
| 4 | 2.5Y 6/2 | Medium gray-brown |
| 5 | 10YR 7/4 | Light gray-brown |
| 6 | 10YR 6/2 | Medium gray-brown |
| 7 | 10YR 6/2 | Medium gray-brown |
| 8 | N9.0/ | Off-white |
| 9 | 5Y 8.5/1 | Light gray-yellow |
| 10 | N9.5/ | Near-white |

## Cast-Iron Columns - Lantern

| Layer | Munsell No. | Color |
|---|---|---|
| 1 | N9.5/ | Near-white |
| 2 | 2.5G 2/4 | Very dark green |
| 3 | 5GY 8/1 | Light gray-green |
| 4 | 2.5G 2/5 | Very dark green |
| 5 | 5GY 8/1 | Light gray-green |
| 7 | 10GY 7/1 | Medium gray-green |
| 8 | 10GY 7/1 | Medium gray-green |
| 9 | 10GY 7/1 | Medium gray-green |
| 10 | 10GY 7/1 | Medium gray-green |
| 11 | 10GY 7/1 | Medium gray-green |
| 12 | 10G 2/4 | Very dark green |
| 13 | N9.5/ | Near-white |

## Windows

### First Floor

| | | |
|---|---|---|
| 1 | 5G 3/4 | Dark green |
| 2 | 5Y 9/1 | Ivory |
| 3 | N2.5/ | Very dary gray |
| 4 | 5G 4/4 | Dark green |
| 5 | N2.0/ | Near-black |
| 6 | N8.5/ | Very light gray |
| 7 | N1.5/ | Near-black |

### Upper Drum

| | | |
|---|---|---|
| 1 | 10G 2/4 | Very dark green |
| 2 | 5Y 9/2 | Cream |
| 3 | N9.25/ | Off-white |
| 4 | N1.0/ | Black |

### Base of Dome - Bull's-eye

| | | |
|---|---|---|
| 1 | 2.5G 2/4 | Very dark green |
| 2 | 7.5GY 8/2 | Light gray-green |
| 3 | 2.5G 3/4 | Dark green |
| 4 | 5GY 8/1 | Light gray-green |
| 5 | 5G 2/4 | Dark green |
| 6 | N1.75/ | Near-black |
| 7 | N1.0/ | Black |

## Casements at Lantern Base

#1-East of scuttle (recent sash-frame only)

| | | |
|---|---|---|
| 1 | 2.5G 5/6 | Medium gray-green |
| 2 | 7.5G 3/4 | Dark green |
| 3 | 10GY 8/2 | Light gray-green |
| 4 | 7.5G 2/4 | Dark green |
| 5 | 5GY 9/1 | Light gray-green |
| 6 | N1.5/ | Near-black |
| 7 | N2.0/ | Near-black |

#2-Sash only (recent frame)

| | | |
|---|---|---|
| 1 | 7.5G 2/4 | Dark green |
| 2 | N1.0/ | Black |
| 3 | N1.75/ | Near-black |

#3-Fan, recent frame

#4-Recent sash and frame

#5-Frame only (recent sash)

| | | |
|---|---|---|
| 1 | 7.5G 3/4 | Dark green |
| 2 | N9.5/ | Near-white |
| 3 | 7.5G 3/4 | Dark green |
| 4 | N1.0/ | Black |
| 5 | N1.25/ | Black |

#6-Recent sash and frame

#7-Fan, frame only

| | | |
|---|---|---|
| 1 | 2.5G 3/4 | Dark green |
| 2 | 5Y 7/2 | Medium gray-yellow |
| 3 | 5R 2/2 | Very dark brown-red |
| 4 | 5Y 7/2 | Medium/light gray-yellow |
| 5 | 5Y 7/2 | Medium/light gray-yellow |
| 6 | 5Y 7/2 | Medium/light gray-yellow |
| 7 | 5Y 8.5/2 | Light gray-yellow |
| 8 | 5G 2/2 | Green-black |
| 9 | 7.5GY 8/2 | Light green-gray |
| 10 | 5G 2/4 | Very dark green |
| 11 | 7.5GY 8/2 | Light gray-green |
| 12 | 5G 2/4 | Very dark green |
| 13 | N9.5/ | Near-white |
| 14 | N0.75/ | Black |

#8-Recent sash and frame

## Wrought-Iron Railing - East Portico

| Layer | Munsell No. | Color |
|---|---|---|
| 1 | 10R 3/6 | Dark brown-red (metallic paint simulating bronze) |
| 2 | 2.5Y 6/2 | Medium gray-brown |
| 3 | 5Y 7/1 | Medium/light gray |
| 4 | N2.5/ | Very dark gray |
| 5 | 10Y 7/1 | Medium/light gray-green |
| 6 | N2.0/ | Near-black |
| 7 | 10Y 7/1 | Medium/light gray-green |
| 8 | 10Y 2/1 | Yellow-black |
| 9 | N9.0/ | Off-white |
| 10 | 10YR 4/6 | Medium brown-yellow (metallic paint simulating bronze) |
| 11 | N8.0/ | Very light gray |
| 12 | N2.5/ | Very dark gray |
| 13 | N8.5/ | Very light gray |
| 14 | N2.0/ | Near-black |

## SCHEDULE OF COLORS FOR RESTORATION

| Munsell No. | Location of Paint |
|---|---|
| 5Y 9/1 | Stone walls; brick walls; copper-covered walls; lead-coated copper cornice cover; window frames, sills, and trim; basement door frames, trim, and thresholds; wheelchair lift; lantern rail; flagpole |
| 2.5G 2/4 | Window sash and basement doors |
| 10R 3/6 (metallic paint simulating bronze) | Portico railings; north portico gates |
| Black | Window guards |
| Gold leaf | Sphere above lantern dome |
| Natural patina copper | Main dome; lantern dome |

## ACCESS FOR THE HANDICAPPED

Federal laws and regulations governing access to federal buildings by the handicapped are not discussed in this section. They are treated at length in Accommodation of Handicapped Visitors at Historic Sites (1979), prepared by Harold Russell Associates, Inc., for the National Park Service.

For purposes of discussion of access by the handicapped to the interior of the old courthouse, it is assumed that maximum accommodation, generally considered to be accommodation for a person in a wheelchair, is desired. Because the old courthouse is a major architectural monument, such accommodation must be accomplished without unacceptable physical or visual impact on the structure.

There are two groups of locations for potential access--the portico steps and the courtyards. These in turn are analyzed in terms of the three types of devices that could be used--ramps, vertical lifting devices, and inclined lifting devices. Access location also needs to be considered in relation to the operation of the courthouse. The east entrance is the historic one and currently the most heavily used; this use is likely to continue. In addition, the east wing houses information, sales and orientation functions, and the film room, all of which generate intensive activity. This visitor concentration does not occur at the west wing or the north or south entrances.

### Porticoes and Courtyards

Ramps. The standard for a ramp for the handicapped requires a minimum of 12" of length for each inch of vertical rise. This would require a total length of about 88' at the east portico and approximately 70' at the west portico. In each case, the ramp would have to be built in at least five or six sections to limit each section to an acceptable length. Horizontal platforms for turning would be necessary between sections. Similar conditions would exist at the north portico. At all locations, construction of a ramp would create an almost complete blockage of the sidewalk and an unacceptable visual intrusion.

A ramp could be installed in any of the four courtyards, its length averaging 75' in addition to the required horizontal platforms. A section of the portico railing would have to be removed at each location. Sufficient area would be available at the northeast courtyard, and sufficient clearance would be possible over the areaway steps. Installation at the southeast courtyard would be complicated by the fountain and the sundial. The northwest and southwest courtyards are more constricted, and there would be limited headroom at the areaway steps. In all cases, a paved walk to the ramp would be required. Further, it would be necessary at all courtyards for a park staff member to unlock and lock the gate before and after each access. Ramps in the courtyards would not affect use of the sidewalks, but they would create an unacceptable visual intrusion.

Ramps at the portico steps and in the courtyards would be reversible, meaning they could be removed and repairs made to the sidewalks, buildings, and grounds with minimal effect. An exception would be removal of the sections of portico railing, which would constitute an adverse effect due to the cutting necessary.

In the case of the major ramps described below, an additional ramp would be needed at the porticoes. This ramp would have to be at least 10' long and high enough to get over the entrance step, which is 7" to 7½" above the portico floor.

Vertical Lifting Devices. This type of device consists of a semienclosed steel platform that can be entered at one end and exited at the other. It could be installed at the east wing, over the east end of the south areaway. A supporting steel or concrete block structure would have to be built in the areaway to hold the lift at the areaway coping level when at rest, and a fillerplate and a steel curb would be needed at the coping and the portico floor, respectively. At the portico floor a section of the historic railing would have to be cut out to receive a special gate, or else the entire historic railing would have to be replaced. The window grille below the portico railing would have to be removed, and a protective plywood cover installed over the window.

To reach the top of the wall coping, a ramp approximately 16' long would be required, as well as a paved walk from the sidewalk gate to the ramp. Access would require a companion of the handicapped person to obtain keys to enter the courtyard and operate the device, if this would be acceptable; otherwise, this would have to be done by a park staff member. An audible or visual signal from the gate to the control desk in the courthouse might be considered.

This device could not be installed at the north end of the east portico nor at either end of the west portico because it would block the steps. If installed at the north portico, the lift would be subject to vandalism, partly block the sidewalk, and be a direct visual intrusion on the portico. The lift could not be installed at the south entrance.

A vertical wheelchair lift at the east portico would be a visual intrusion, but much less so than the ramps previously described. The installation would be reversible, and the minor patching required in the areaway and edge of the portico would probably not be an adverse effect. Cutting of the historic railing would be an adverse effect. The cost for the lift installation is estimated at approximately $7,000, plus $2,000 for structural and electrical work.

Inclined Lifting Devices. The inclined wheelchair lift or elevator can, as its name suggests, be adapted to a flight of steps. An open steel platform with tilt-up safety ramps at each end is hung from a vertical carrier element, which in turn is pulled along two steel tubes supported by steel uprights and lateral stabilizers. When not in use the platform is tilted up to a vertical position. A drive box 3' 6" high, 2' wide, and 1' thick is stationed at the top of the run; at the bottom is an arrestor unit

2' 3" high, 1' 2" wide, and 6" thick. Both of these elements are steel. The two 2" diameter tubes housing the haul cables, and the cables themselves, can be supplied in stainless steel for greater durability and smoother operation.

The lift could be installed at either the east or west steps along the inside face of one of the cheek walls. At the west wing the device would be more remote from visitor traffic than at the east wing because the west steps are wider. Also, as previously noted, there is less visitor traffic through the west portico.

The drive unit, and the lift when not used, would be set at the inner face of a column at the end of a cheek wall in either case. The arrestor unit would be located on the face of the cheek wall toward the street, at the foot of the steps. At this location could be mounted a button activating an audible or visual signal to summon a staff member, who by a keyed switch on the lift control panel would send the platform to the sidewalk level. If desired, a key call switch could also be installed near the signal button.

The installation would require small column supports for the tubes, wall brackets for lateral bracing at the lower end, and inclined bracing to the top of the cheek wall at the upper end. In addition, drilling into the portico floor and the sidewalk end of the cheek wall would be necessary for mounting the drive unit and arrestor, respectively, and for installing conduit. If the system was removed, the holes in the portico floor could be plugged with the same material, as could those in the granite steps which are not historic (1955). Plugs in the cheek wall would be painted and thus not noticeable. The visual impact of these repairs would be so minor that the effect would not be adverse. Destruction of original material from the installation would be adverse in itself; however, the loss of this small amount of material in relation to the enormous mass of the building would not appear to be an adverse effect on its overall character.

Because of the design, size, and placement of the elements of this type of system, it would probably be as inconspicuous as any device could be which would perform the required function. However, the visual intrusion created would constitute an adverse effect. It would be more intrusive than the vertical lift described above. Justification would rest on the degree to which the handicapped segment of the public is benefited, as determined by management.

### Recommendation

It is recommended that an incline lifting device be installed, preferably at the south cheek wall of the west wing. Installation should include a special finish to match the color of the building and weathertight enclosures for the lift and drive units.

The estimated cost is $17,000 for the lift installation, which includes stainless steel tubes and drive cables. An additional $2,000 would be required for electrical work.

If a device of this type by any foreign manufacturer is to be used, justification will be necessary to satisfy the requirements of federal procurement regulations.

## LIGHTNING PROTECTION

According to the St. Louis Daily Democrat, on April 8, 1862, about 10:00 p.m., "a bolt of lightning struck the Court House dome and was conducted by the safety rods to the earth." No drawings or written documents, from that time or later, have been discovered giving a description and location of the rods. Nor are there other known records of a lightning protection system until planning commenced for installation of the present aluminum flagpole in June 1971.

best copy available

A memorandum dated June 1970 (H-30(WSC)C/R D-46), from the chief, Environmental Planning and Design, to the superintendent, JNEM, describes the pole and associated bonding and grounding work. This work included bonding conductors for the cast-iron structure and copper sheathing of the lantern dome, from the latter via bolted connections or bonding jumpers to the main dome iron structure; determination of mechanical continuity of lower iron structural members; and bonding jumpers if needed, otherwise, ground wires to 10' long ground rods at the basement (earth). Iron structure or ground wires were to be grounded also to the nearest water service pipe and to the electrical service entrance ground connector.

It is known that bonding conductors of some type were installed in the lantern dome, but it is not known if all or any of the other work to ensure continuity to ground was actually done, as called for in the cited memorandum. A continuity test from the lantern dome structure via a direct wire to a fire hydrant at the sidewalk was made by Lloyd Fischer, electrical specialist at the park. The result was well under the permitted resistance limit required by standards of Underwriters Laboratories, Inc.

HABS drawings and investigation have determined that mechanical (bolted) continuity exists from the wrought-iron columns supporting the lantern dome iron structure down to the base of the main dome. From there a separate but mechanically connected cast-iron structural column system, supporting decorative elements of the inner dome, continues down to the fourth level. At this location the column loads are apparently transferred to iron beams, then to concentric columns from the third level down to the rotunda first floor, which rests on grade.

It is recommended that additional tests be made to determine if continuity exists from the lantern dome, through its structure and the main dome structure to its base, and from that location to ground, through the lower cast-iron columns down to first-floor level. Depending on the results of the tests, additional bonding and grounding should be considered.

# ALTERNATIVES

## ALTERNATIVE A

Under this alternative, all surfaces and materials would be removed of all paint, cleaned, and repaired, as described in the recommended treatment. Stone and brick masonry would be treated with water repellent to retard erosion. Basement doors and frames, window frames and sash, metal railings, dome base and crown balustrade, cast-iron glazed grids, lantern, gilded sphere, and flagpole would be painted.

This treatment might produce an appearance substantially like that of the building between December 1861--when the exterior of the present structure was completed--and the spring of 1864 when the first overall exterior painting had been accomplished. However, it would be partly or largely conjectural, since as indicated in the "Historical Background" section, earlier painting, perhaps to 1845, of a portion of the courthouse might have survived to the 1861-64 period. It is extremely unlikely that sufficient physical evidence can be retrieved from the building to establish definitively the location, extent, and character of the earlier painted areas.

The masonry areas left unpainted might have an interesting appearance, but possibly unacceptable because of irregularities in stone, brick, and joint mortar as well as numerous exposed patches at cracks, spalled areas, etc. It is quite likely for just these reasons that the entire building was painted in the first place.

In the opinion of the National Bureau of Standards consultants, treating the masonry with water repellent would not provide as much protection against weathering and pollution attack as painting would. In fact, the consultants believe that the stone, at least, given its questionable quality, would not have survived as well as it has if it had not been painted for most of its life.

## ALTERNATIVE B

Under alternative B, the entire building would be painted as outlined in the "Painting and Color Chronology" section. The main and lantern domes would be painted as well. Should future information confirm that the domes were not originally painted, this would result in a historically inaccurate appearance. Also, keeping the domes in an acceptable appearance would mean much heavier maintenance problems because of the copper roofing and the difficulty of access.

Neither alternative A nor alternative B is recommended.

# ANALYSIS OF EFFECTS

## RECOMMENDED TREATMENT

Removing paint and cleaning the surfaces would have an effect, although not adverse, because some of the original paint would be removed. This effect would be justified because the action would permit corrective repairs necessary to preserve the building. The same would be true of the replacement of deteriorated windows in the upper drum, dome base, and lantern base, and of the remaining lights of original glass in the cast-iron bull's-eye grid section in the lantern.

Replacing missing mortar in stone and brick joints and filling cracks would have no adverse effect. Cutting out pieces of stone at major cracks to permit reinforcement with steel rods and epoxy would constitute an adverse effect because original material would be destroyed. However, the action would be justified because it would prevent further damage to the building. A similar effect and justification would apply to replacement of decomposed stone sections at the lower drum.

Drilling of deteriorated cornice sections for reinforcing steel and epoxy would have an effect, although not adverse, because the historical appearance of the cornice would not be changed. Replacement of very badly deteriorated sections of the cornice by new stone sections would be adverse because historic material would be destroyed. Nevertheless, the action would be justified since the historical appearance would be preserved, and a hazard to public and staff safety and the danger of further damage to the building would be eliminated.

Covering the top of the main cornice, including the vertical parapet, with metal flashing would have an effect but not an adverse one. This action would cover over the historic stone top surface and parapet wall of the cornice. The covering would not be visible from ground level on the top surface but would be at the outer drip edge of the cornice and on the upper portion of the parapet wall. The flashing would be painted the same color as the building to reduce its visual impact. This action is justified because it would protect this highly exposed, pitted, and spalled stone from further deterioration due to weathering effects. The flashing would tie into the roof to provide a waterproof protective covering, stopping the continual leaks at the exterior walls.

Minor repairs to basement doors, all windows, and to copper and cast-iron columns and grids would have no adverse effect, nor would repainting the building to the historically accurate colors.

## ALTERNATIVE A

Leaving the building unpainted would constitute an adverse effect, since the resultant condition would present a conjectural appearance. Even if not conjectural, the restored appearance to the late 1861 to early 1864 period would not be representative of the building's character during most of its historic life. It is probable that the intent of the justices was to paint the entire building soon after exterior completion in late 1861.

## ALTERNATIVE B

Painting the main dome and the lantern dome, unless final investigation determines conclusively that they were in fact painted in the early history of the courthouse, would constitute an adverse effect on the quality of the character of the building.

## CONSTRUCTION COST ESTIMATE

DESCRIPTION OF PROJECT: Exterior Rehabilitation of Old Courthouse

PARK Jefferson National Expansion Memorial NHS PREPARED BY D. Henderson and A. Williams

.ACKAGE NO. 160 and 201 DATE: May 1980

DRAWING NO. -- REVIEWED BY:

| ITEM NO. | ITEM | ESTIMATED QUANTITY | UNIT | UNIT PRICE | TOTAL AMOUNT |
|---|---|---|---|---|---|
| | BUILDINGS AND UTILITIES | | | | |
| | | | | | |
| | PHASE I Water Intrusions - Wing Roofs | Contract Complete | | 2/7/79 | $211,334 |
| | (Roof and Roof Drainage Repairs) | | | | |
| | | | | | |
| | PHASE II Exterior Preservation | | | | |
| | A. Lantern | Contract Completed | | April 1980 | $372,808 |
| | (Includes Fire Damage Repair) | | | | |
| | B. Dome and Drums | Contract Underway | | --- | $384,423 |
| | | | | | |
| | C. Main Building (Lower Walls) | Lump Sum | --- | --- | $1,580,000 |
| | 1. All of the East Wing and a | Lump Sum | --- | --- | $430,000 |
| | Portion of the North Wing | | | | |
| | 2. Balance of the North Wing | Lump Sum | --- | --- | $645,000 |
| | and all of the West Wing | | | | |
| | 3. South Wing | Lump Sum | --- | --- | $505,000 |
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(SEE NEXT SHEET)

## CONSTRUCTION COST ESTIMATE

DESCRIPTION OF PROJECT: Exterior Rehabilitation of Old Courthouse

PARK Jefferson National Expansion Memorial NHS PREPARED BY D. Henderson and A. Williams

ACKAGE NO. 201 DATE: May 1980

DRAWING NO. REVIEWED BY:

| ITEM NO. | ITEM | ESTIMATED QUANTITY | UNIT | UNIT PRICE | TOTAL AMOUNT |
|---|---|---|---|---|---|
| | BUILDINGS & UTILITIES | | | | |
| | | | | | |
| | Cornice Replacement - Lower Walls | Lump Sum | --- | --- | $1,450,0 |

(SEE NEXT SHEET)

## CONSTRUCTION COST ESTIMATE

DESCRIPTION OF PROJECT: MODILLION REPLACEMENT - OLD COURTHOUSE

PARK Jefferson National Expansion Memorial National Historic Site

PREPARED BY A. Williams

PACKAGE NO. 201

DATE: 3/24/81

DRAWING NO. 366/25,001A

REVIEWED BY:

| ITEM NO. | ITEM | ESTIMATED QUANTITY | UNIT | UNIT PRICE | TOTAL AMOUNT |
|---|---|---|---|---|---|
| 1. | Replace stone modillions | | | | |
| | Opt. 1. with stone | 5 | each | 3,200 | $16,000 |
| | Opt. 2. with fiberglas | 5 | each | 1,200 | 6,000 |
| 2. | Paint | 5 | each | 50 | 250 |
| | | | | | |
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(SEE NEXT SHEET)

## APPENDIX

## PRESERVATION PRIORITY DEVELOPMENT OUTLINE

This outline, which is included in the "Task Directive" approved July 2, 1976, and reproduced in the phase I report, is unwieldy, confusing, and repetitious. For example, the three sections titled Water Intrusion (IIA), Structural (IIB, Investigation/Analysis), and Exterior Preservation (IIC) really deal with the same thing and should be combined. Repointing exterior masonry will prevent water intrusion, in conjunction with repairs and consolidation of structural faults as determined by structural analysis. Another example is listing of the floors of the building under IIA, 7-10, Water Intrusions, whereas they should appropriately be included with Interior Preservation.

Accordingly, of the many elements shown in the original outline, some have been eliminated and others consolidated or relocated in the revised outline shown below. The new outline, divided into the four phases designated in the "Preface," provides a rational organization of elements of the historic structure report which corresponds to a clear sequence of construction operations. The old outline is included in this appendix as a reference, but the new outline will be the principal functional guide. (Note that "Phase IV: Historic Landscape Preservation" is not included in the old outline.)

Historic structure preservation guides include working drawings and specifications, and their preparation depends on new information developed during construction. Therefore, they are included as the last element in each phase.

HABS drawings (if funded), being archival documents and not part of the planning and construction work, are placed in a separate category--phase V. These drawings would actually be revisions of the existing 1934-41 HABS drawings, as determined by the as-constructed drawings and with supplemental surveys.

## PRESERVATION PRIORITY DEVELOPMENT OUTLINE - REVISED

### PHASE I: WATER INTRUSIONS - WING ROOFS

- A. Lead-coated copper roofing
- B. Gutters and drains
- C. Flashing
- D. Downspouts
- E. Historic structure preservation guide

### PHASE II: EXTERIOR PRESERVATION - WINGS, DRUMS, DOME, AND LANTERN

- A. Wings
    - 1. Stone and brick walls, stone pilasters
    - 2. Parapets and cornices
    - 3. Porticoes and pediments
    - 4. Chimneys
    - 5. Wood doors and windows
    - 6. Roof and portico floodlights
    - 7. Wrought-iron portico railings
    - 8. Granite steps
- B. Drums
    - 1. Lower octagonal drum (stone)
    - 2. Upper circular drum
        - a. Cast-iron columns
        - b. Stone walls and cornice
        - c. Wood double-hung windows
    - 3. Downspouts
- C. Dome
    - 1. Copper base and consoles
    - 2. Wood portal windows
    - 3. Copper cornice, gutter, and flashing
    - 4. Copper dome
    - 5. Copper top ring (crown)
- D. Lantern
    - 1. Tile walk and aluminum balustrade
    - 2. Copper base and wood casement windows
    - 3. Cast-iron columns
    - 4. Cast-iron glazed grids
    - 5. Copper entablature and flashing
    - 6. Copper dome, ring, and consoles
    - 7. Gilded, elongated sphere
    - 8. Aluminum flagpole with gilded finial
- E. Historic structure preservation guide

## PHASE III: INTERIOR PRESERVATION AND ADAPTIVE RESTORATION

- A. Preservation
    - 1. Heating system
    - 2. Plumbing system
    - 3. Air conditioning - selected areas
        - a. Cooling
        - b. Dehumidification
    - 4. Electrical system
    - 5. Fire detection and alarm system
    - 6. Fire suppression system (analyze need and feasibility)
    - 7. Intrusion detection and alarm system (analyze need and feasibility)
    - 8. Public address system
- B. Adaptive restoration
    - 1. Rotunda
    - 2. First-floor corridors
    - 3. Second-floor corridors
    - 4. East and west courtrooms - second floor
    - 5. Iron stairs
    - 6. Third-floor corridors
    - 7. Administrative and service areas - basement
    - 8. Exhibit areas - first and second floors
    - 9. Administrative areas - first and second floors
    - 10. Service areas - first and second floors
    - 11. Service areas - third floor, north wing
- C. Historic structure preservation guide

## PHASE IV: HISTORIC LANDSCAPE PRESERVATION

- A. Sidewalks
- B. Street lights
- C. Signs
- D. Iron fence and stone base
- E. Walks
- F. Areaways and steps
- G. Ground cover
- H. Plantings
- I. Fountain
- J. Sundial
- K. Floodlights
- L. Miscellaneous
- M. Building exterior downspouts
- N. Window awnings
- O. Historic structure preservation guide

## PHASE V: HISTORIC AMERICAN BUILDINGS SURVEY DRAWINGS

If funded

JEFFERSON NATIONAL EXPANSION MEMORIAL NHS
ST. LOUIS COURTHOUSE - ST. LOUIS, MISSOURI
PROPOSED PRESERVATION PRIORITY DEVELOPMENT OUTLINE

| ITEM 1 | DENVER SERVICE CENTER | | | 91 |
|---|---|---|---|---|
| | 35 | 36 | 37 | Construction |
| I. Historical Data | 22,000 | | | |
| II. Architectural Data Section | | | | |
| A. Water Intrusions (HSR) | | | | |
| 1. Roof - Wings - North, South, East, Wes | 25,000 | 11,520 | 11,520 | 76,800 |
| a. Roof Terneplate | | | | |
| 1) Seams | | | | |
| 2) Plates | | | | |
| 3) Flashing | | | | |
| b. Gutters | | | | |
| c. Downspouts | | | | |
| d. Parapets | | | | |
| e. HABS Drawings* | 1,000 | | | |
| f. Preservation Guide | | | 500 | |
| 2. Dome | 21,000 | 10,200 | 10,200 | 68,000 |
| a. Roof - Copper | | | | |
| b. Gutters - Copper | | | | |
| c. Portal Windows | | | | |
| d. Flashing | | | | |
| e. HABS Drawings* | 1,600 | | | |
| f. Preservation Guide | | | 1,000 | |
| 3. Lantern | 14,000 | 8,100 | 8,100 | 54,000 |
| a. Roof | | | | |
| b. Gutters | | | | |
| c. Windows and Frames | | | | |
| d. Walkway | | | | |
| e. Flashing | | | | |
| f. HABS Drawings* | 1,600 | | | |
| g. Preservation Guide | | | 1,000 | |
| 4. Drum (Exterior) | 10,500 | 2,700 | 2,700 | 18,000 |
| a. Cornices - Ledges | | | | |
| b. Gutters - Downspouts | | | | |
| c. Window Frames | | | | |

Sheet 1

## JEFFERSON NATIONAL EXPANSION MEMORIAL NHS
## ST. LOUIS COURTHOUSE - ST. LOUIS, MISSOURI
## PROPOSED PRESERVATION PRIORITY DEVELOPMENT OUTLINE

| | DENVER SERVICE CENTER | | | 91 |
|---|---|---|---|---|
| | 35 | 36 | 37 | Construction |
| ITEM 1 (cont) | | | | |
| A. Water Intrusions (cont.) | | | | |
| d. Flashing | | | | |
| e. HABS Drawings* | 1,000 | | | |
| f. Preservation Guide | | | 1,000 | |
| ITEM 2 | | | | |
| 5. Walls Exterior - Wings - North, South, East, West | | | | |
| a. Cornices - Pediments | 28,000 | 67,500 | 67,500 | 450,000 |
| b. Fascia | | | | |
| c. Chimneys | | | | |
| d. Windows and Openings | | | | |
| e. Doors and Openings | | | | |
| f. HABS Drawings* | 10,000 | | | |
| g. Preservation Guide | | | 3,000 | |
| 6. Porticos - North, South, East, West | | | | |
| a. Roof | 14,000 | 20,250 | 20,250 | 135,000 |
| b. Pediment | | | | |
| c. Fascia | | | | |
| d. Ceilings Limestone | | | | |
| e. Foundations | | | | |
| f. HABS Drawings* | 2,000 | | | |
| g. Preservation Guide | | | 1,000 | |
| 7. Third Floor & Attic | | | | |
| a. HABS Drawings* | 18,000 | 81,000 | 81,000 | 540,000 |
| b. Preservation Guide | 4,000 | | 4,000 | |
| 8. Second Floor | | | | |
| a. HABS Drawings* | 14,000 | 54,000 | 54,000 | 360,000 |
| b. Preservation Guide | 6,000 | | 4,000 | |
| 9. First Floor | | | | |
| a. HABS Drawings* | 10,500 | 40,500 | 40,500 | 270,000 |
| b. Preservation Guide | 6,000 | | 4,000 | |
| 10. Basement | | | | |
| a. Windows and Openings (Exterior) | 14,000 | 40,500 | 40,500 | 270,000 |
| b. Doors and Openings (Exterior) | | | | |
| c. Other Sources of Moisture | | | | |
| d. HABS Drawings* | 4,000 | | | |
| e. Preservation Guide | | | 2,000 | |

Sheet 2

### JEFFERSON NATIONAL EXPANSION MEMORIAL
### ST. LOUIS COURTHOUSE - ST. LOUIS, MISSOURI
### PROPOSED PRESERVATION PRIORITY DEVELOPMENT OUTLINE

| ITEM 3 | DENVER SERVICE CENTER | | | 91 |
|---|---|---|---|---|
| | 35 | 36 | 37 | Constructio |
| **B. Structural** (Moments,Shear,Flexure,Compression,TEnsion) | | | | |
| 1. Roofs - Wings - North,South,East,West | 10,500 | 67,500 | 67,500 | 450,000 |
| a. Structural Trusses, Beams,Anchorage Connections | | | | |
| b. Horizontal and Vertical Loads | | | | |
| c. Tension Straps (Top of Walls) | | | | |
| d. Suspended Ceilings (Loads and Hangers) | | | | |
| e. Portico (Tension Rods, Loads) | | | | |
| f. Cornice Connections | | | | |
| g. Parapet Connections | | | | |
| h. Purlins | | | | |
| i. Trusses | | | | |
| j. Pediments | | | | |
| l. HABS Drawings* | 4,000 | | | |
| m. Preservation Guide | | | 2,000 | |
| 2. Dome | 14,000 | 33,750 | 33,750 | 225,000 |
| a. Trusses, Ribs and Base Plates | | | | |
| b. Compression (Rings and Connections) | | | | |
| c. Cross Bridging (Wood and Steel) | | | | |
| d. Purlins Wood | | | | |
| e. HABS Drawing* | 4,000 | | | |
| f. Preservation Guide | | | 2,000 | |
| 3. Lantern | 8,000 | 6,750 | 6,750 | 45,000 |
| a. Roof | | | | |
| b. Walls | | | | |
| c. Floor Glass and Steel Grid | | | | |
| d. Balustrade (Cast Aluminum) | | | | |
| 4. Drum | 8,000 | 10,125 | 10,125 | 67,500 |
| a. Walls - Brick Core and Stone | | | | |
| b. Columns, Beams - Cast Iron | | | | |
| c. Buttresses - Brick Interior | | | | |
| d. Rotunda Balconies | | | | |

Sheet 3

JEFFERSON NATIONAL EXPANSION MEMORIAL NHS
ST. LOUIS COURTHOUSE - ST. LOUIS, MISSOURI
PROPOSED PRESERVATION PRIORITY DEVELOPMENT OUTLINE

| | DENVER SERVICE CENTER | | | 91 Construction |
|---|---|---|---|---|
| | 35 | 36 | 37 | |
| ITEM 3 (cont) | | | | |
| B. Structural (cont.) | | | | |
| 5. Walls - Wings - North, South, East, West | | | | |
| a. Brick Core and Limestone Facing | 18,000 | 20,250 | 20,250 | 135,000 |
| b. Anchoring Ties | | | | |
| c. Independent Walls (Interior) | | | | |
| 6. Foundations | | | | |
| a. Tests | 10,500 | 10,125 | 10,125 | 67,500 |
| 1) Soil Analysis | | | | |
| 2) Compression East Wing | | | 2,000 | |
| 3) Vibration Analysis | | | 2,000 | |
| 4) Earthquake Calculations | | | | |
| 5) HABS Drawings* | | | | |
| 6) Preservation Guide | 2,000 | | 1,000 | |
| ITEM 4 | | | | |
| C. Exterior Preservation | | | | |
| 1. Brick Preservation | | | | |
| a. Third Floor Brick Core | 10,500 | 54,000 | 54,000 | 360,000 |
| b. Condition of Brick and Mortar | | | | |
| c. Sources of Deterioration | | | | |
| 2. Stone Preservation | | | | |
| a. Condition of Stone and Mortar | 18,000 | 108,000 | 108,000 | 720,000 |
| b. Sources of Deterioration | | | | |
| 3. Copper | | | | |
| a. Roofs - Lantern, Dome | 8,000 | 13,500 | 13,500 | 90,000 |
| b. Downspouts, Gutters | | | | |
| c. Mouldings | | | | |
| 4. Cast Iron | | | | |
| a. Columns | 3,500 | 20,250 | 20,250 | 135,000 |
| b. Mouldings | | | | |
| c. Grilles | | | | |
| 5. Cast Aluminum | | | | |
| a. Balustrades | 2,000 | 5,400 | 5,400 | 36,000 |

Sheet 4

JEFFERSON NATIONAL EXPANSION MEMORIAL NHS
ST. LOUIS COURTHOUSE - ST. LOUIS, MISSOURI
PROPOSED PRESERVATION PRIORITY DEVELOPMENT OUTLINE

| C. Exterior Preservation (cont.) | DENVER SERVICE CENTER | | | 91 |
|---|---|---|---|---|
| | 35 | 36 | 37 | Construction |
| 6. Wood | 3,500 | 10,200 | 10,200 | 68,000 |
| a. Doors | | | | |
| b. Windows | | | | |
| c. Trim | | | | |
| ITEM 5 | | | | |
| D. Heating, Cooling and Dehumidification System Preservation | 18,000 | 135,000 | 135,000 | 900,000 |
| 1. HABS Drawings* | 15,000 | | | |
| 2. Preservation Guide | | | 15,000 | |
| E. Plumbing System Preservation | 14,000 | 54,000 | 54,000 | 360,000 |
| 1. HABS Drawings* | 2,000 | | | |
| 2. Preservation Guide | | | 6,000 | |
| F. Fire Suppression System Preservation | 14,000 | 21,600 | 21,600 | 144,000 |
| 1. HABS Drawings* | 2,000 | | | |
| 2. Preservation Guide | | | 2,400 | |
| G. Electrical System Preservation | 16,000 | 13,500 | 13,500 | 90,000 |
| 1. HABS Drawings* | 10,000 | | | |
| 2. Preservation Guide | | | 10,000 | |
| H. Fire and Intrusion Detection Alarm System Preservation | 14,500 | 20,250 | 20,250 | 135,000 |
| 1. HABS Drawings* | 2,400 | | | |
| 2. Preservation Guide | | | 2,000 | |
| ITEM 6 | | | | |
| I. Interior Preservation | 30,000 | 15,000 | 15,000 | 100,000 |
| 1. Rotunda | | | | |
| a. Murals | | | | |
| b. Frescoes | | | | |
| c. Lunettes | | | | |
| 2. Drum | | | | |
| 3. Flooring | | | | |
| 4. Wall and Ceiling | | | | |

Sheet 5

## JEFFERSON NATIONAL EXPANSION MEMORIAL NHS
## ST. LOUIS COURTHOUSE - ST. LOUIS, MISSOURI
## PROPOSED PRESERVATION PRIORITY DEVELOPMENT OUTLINE

| | DENVER SERVICE CENTER | | | 91 |
|---|---|---|---|---|
| | 35 | 36 | 37 | Construction |
| ITEM 6 (cont.) | | | | |
| I. Interior Preservation (cont.) | | | | |
| 5. Doorways - Doors | | | | |
| 6. Window Areas | | | | |
| 7. Stairways - Iron | | | | |
| 8. Trim Mouldings | | | | |
| 9. Hardware | | | | |
| 10. Finishes<br>a. Paint | | | | |
| 11. HABS Drawings* | 35,000 | | | |
| 12. Preservation Guide | | | 20,000 | |
| ITEM 7 | | | | |
| J. HABS Drawings - *All HABS drawings will be accomplished in this phase. | | | | |
| TOTALS | 525,600 | 955,470 | 1,037,370 | 6,369,800 |

# GLOSSARY OF ARCHITECTURAL TERMS

ARCH. A curved construction that spans an opening.

ARCHITRAVE. In classical orders the lowest member of the entablature; the beam that spans from column to column, resting on their capitals.

AREAWAY. An open subsurface space adjacent to a building used to admit light and air or as a means of access to a basement or crawl space.

BALUSTRADE. An entire railing system (as along the edge of a balcony), including a top rail and its balusters and sometimes a bottom rail.

BULL'S-EYE WINDOW. A round or oval aperture open, louvered, or glazed.

CAPITAL. The topmost number, usually decorated, of a column, pilaster, anta, etc.

COLONNADE. A number of columns, arranged in order, supporting an entablature and usually one side of a roof.

COLUMN. In classical architecture, a cylindrical support consisting of a base (except in Greek Doric), shaft, and capital.

CONSOLE. A decorative bracket in the form of a vertical scroll, projecting from a wall to support a cornice, a door or window head, a piece of sculpture, etc.

CORINTHIAN, CORINTHIAN ORDER. The slenderest and most ornate of the three Greek orders, characterized by a bell-shaped capital with volutes and two rows of acanthus leaves, and with an elaborate cornice.

CORNICE. 1. Any molded projection that crowns or finishes the part to which it is fixed. 2. The third or uppermost division of an entablature, resting on the frieze. 3. The exterior trim of a structure at the meeting of the roof and a wall usually consisting of bed molding, soffit, facia, and crown molding.

CUPOLA. A domical roof on a circular base often set on the ridge of a roof.

DOME. A curved roof structure spanning an area; often spherical in shape.

DORIC. The column and entablature developed by the Dorian Greeks, sturdy in proportion with simple cushion capital, a frieze of triglyphs and metopes, and mutules in the cornice.

DRUM. 1. One of the cylinders of stone which forms a column. 2. A round or polygonal wall below a dome, often pierced with windows.

ENTABLATURE. In classical architecture, the elaborated beam member carried by the columns horizontally divided into architrave (below), frieze, and cornice (above). The proportions and detailing are different for each order and strictly prescribed.

EXTENSION. A wing or structure added to an existing building.

FACADE. The exterior face of a building that is the architectural front, sometimes distinguished from the other faces by elaboration of architectural or ornamental details.

FASCIA, FACIA. Any flat horizontal member or molding with little projection, as the bands into which the architraves of Ionic and Corinthian entablatures are divided.

FRIEZE. 1. The middle horizontal member of a classical entablature, above the architrave and below the cornice. 2. A similar decorative band in a stringcourse or near the top of an interior wall below the cornice.

GABLE. The vertical triangular portion of the end of a building having a double-sloping roof from the level of the cornice or eaves to the ridge of the roof.

GREEK CROSS. A cross with four equal arms.

GREEK REVIVAL. A style or architecture prevalent in the first half of the 19th century, usually a close imitation of ancient Greek designs and motifs.

GUTTAE. A series of pendent ornaments, generally in the form of the frustum of a cone, but sometimes cylindrical, usually found on the underside of the mutules and regulae of Doric entablatures.

IONIC. The column and entablature originated by the Ionian Greeks, having a capital with large volutes, a faciated entablature, continuous frieze, and usually dentils in the cornice.

LANTERN. A windowed superstructure crowning a roof or dome.

LINTEL. A horizontal structural member such as a beam over an opening which carries the weight of the wall above it, usually of steel, stone, or wood.

METOPES. The panel between the triglyphs in the Doric frieze, often carved.

MODILLION. A horizontal bracket or console, usually in the form of a scroll with acanthus, supporting the corona under a cornice. Found in Corinthian, Composite, and less frequently Roman Ionic orders.

MUTULE. A sloping flat block on the soffit of the Doric cornice usually decorated with rows of six guttae each. Occurs over each triglyph and each metope of the frieze.

OCULUS. An opening at the crown of a dome.

ORDER. In classical architecture, a particular style of columns with its entablature, having standardized details. The Greek orders were the Doric, Ionic, and Corinthian; the Romans added the Tuscan and Composite.

PARAPET. That part of a wall which is entirely above the roof.

PEDESTAL. A support for a column, statue, urn, etc., consisting in classical architecture of a base dado, or die and a cornice, surbase, or cap; in modern design often a plain unornamented block.

PEDIMENT. 1. In classical architecture, the triangular gable end of the roof above the horizontal cornice, often filled with sculpture. 2. In later work, a surface used ornamentally over doors or windows, usually triangular but may be curved.

PILASTER. An engaged pier or pillar often with capital and base. Decorative features that imitate engaged piers but are not supporting structures, as a rectangular or semicircular member used as a simulated pillar in entrances and other door openings and fireplace mantels; often contains a base, shaft, and capital; may be constructed as a projection of the wall itself.

PORTICO. A porch or covered walk consisting of a roof supported by columns; a colonnaded porch.

RAKING CORNICE. A cornice following the slope of a gable, pediment, or roof.

ROTUNDA. 1. A building round both inside and outside, usually domed. 2. A circular hall in a large building, especially one covered by a cupola.

RUNNING BOND. In masonry, a bond in which bricks or stones are laid lengthwise; all courses are laid as stretchers, with the vertical joints of one course falling midway between those of adjacent courses.

SOFFIT. The exposed undersurface of any overhead component of a building, such as an arch, balcony, beam, cornice, lintel, or vault.

TRIGLYPHS. The characteristic ornament of the Doric frieze, consisting of slightly raised blocks of three vertical bands separated by V-shaped grooves. The triglyphs alternate with plain or sculptured panels called metopes.

TYMPANUM. The triangular or segmental space enclosed by a pediment or arch.

WING. A subsidiary part of a building, extending out from the main portion.

# ADDENDA

## PHASE I: CONSTRUCTION CONTRACT AND LANTERN FIRE DAMAGE REPAIR

This account deals solely with the lantern, the only portion of the building on which rehabilitation work was performed during the first contract. It correlates the description of the lantern's condition and the recommendation for treatment, provided in the body of the historic structure report, with the actual detailed conditions discovered after erection of scaffolding and paint removal and with the corrective treatments actually applied.

Rehabilitation work was accomplished under a negotiated reimbursable-cost-plus-fixed-fee contract, no. CS-6000-9-9001, with Woermann Construction Company of St. Louis. National Park Service representatives were Charles E. Rennison, project supervisor, assisted by Michael E. Hunter, project inspector (later project supervisor for the old courthouse), and David G. Henderson, project historical architect. Superintendent Leo Dreyer was the site representative for Woermann Construction Company. Work commenced in March 1979 and was completed April 15, 1980.

### General Description

This section discusses the lantern as a whole; a detailed analysis of the specific conditions and repairs at each element is provided in subsequent sections. To ensure a more coherent understanding of the work in these sections, they also include the repairs specifically required for that element as a result of damage from the June 14, 1979, fire. In addition, a special section covers the damaged structural elements and the lightning protection system inside the dome.

Following erection of scaffolding to the top of the flagpole, 55' above the dome, an inspection of the entire lantern was made on April 20, 1979. In addition to Rennison, Hunter, and Henderson, the group included Phoebe Weil, conservator and research associate, Center for Archaeometry, Washington University; her assistant, Carol Grissom; and Paul Campbell, research chemist, National Bureau of Standards.

At the upper portion above the dome cornice, conditions ranged from excellent at the aluminum flagpole to deteriorated at the copper pineapple plates or leaves covering the dome. However, the latter appeared to be mainly a surface condition. Except for the gilded sphere below the flagpole, the dome and the copper concentric rings and consoles, or scrolls at the top, had apparently not been repainted for many years.

The dome leaves, rings, and consoles were dented and dimpled because of hailstorms, a condition also found later in the copper at the lower lantern walls. However, there was very little evidence of thermal stress, due to careful design and installation to allow for movement. No cracks, holes, or open joints were evident.

Other than the large number of cracked or broken lights of glass in the cast-iron glazed grids, little could be determined of the condition of the lantern below the dome cornice because of heavy paint buildup on the cast iron and copper. However, the entire structure appeared stable and free of distortion. Other than a few missing screws and extreme discoloration, the cast-aluminum balustrade exterior was in very good condition.

Following the inspection Henderson, Campbell, Weil, and Grissom discussed how to treat the salvageable pineapple leaves on the lantern dome. This included whether to clean and repaint the leaves in place or to remove them. Campbell and Weil mentioned "Black Beauty," a soft abrasive grit derived from a blast furnace by-product. The use of chemical strippers was also evaluated. It was decided that Phoebe Weil would test glass microsphere cleaning on a leaf that had been removed from the dome. Also, it was agreed to consult with copper specialists, which Henderson had contacted, to evaluate repair and replacement methods.

Campbell stated that there should be no trouble in painting the flagpole, and that he would develop a specification with U.S. Navy colleagues who had extensive experience in aluminum coatings.

## Aluminum Flagpole

It was determined that the flagpole, installed in June 1971 and manufactured by the American Flagpole Company, had an anodized finish that was still intact. New steel members were added during installation to reinforce the existing steel supports. The joint where the pole entered the elongated sphere was covered by a two-piece collar and flashing of 8-pound lead soldered together, the collar set in sealant on the pole and held by a stainless steel drawband, and the flashing set in sealant on the sphere and held by 24 stainless steel screws. All elements were in excellent condition, and the only work required was loosening the drawband, applying new sealant, and soldering a short crack in the collar, which was caused by the heat of the fire. Complete details of the flagpole are shown on drawing no. 366/41,900 approved March 18, 1971. The splice ring 25' from the top of the pole was repaired in 1974 or 1975 by C. and B. Erection Company, St. Louis.

The existing aluminum truck was replaced by a heavier model furnished by the pole manufacturer and equipped with stainless steel ball bearings and bushed aluminum sheaves. New aluminum cleats and a new halyard were also installed. The missing ball, or finial, above the truck was replaced by an 8" diameter 14-gauge aluminum ball, also furnished by the pole manufacturer; when gold-leafed, this unit represented a quality standard for the later gold leafing of the elongated sphere.

Considerable discussion occurred as to whether the pole should be painted white for historical correctness and protection, or whether the anodized finish should remain. The park's concerns were the cost of repainting and the difficulty and expense of erecting scaffolding. Project supervisor Rennison learned from the C. and B. Erection Company representative, Carl Brooks, that the pole could be repainted from a bosun's chair. Superintendent Schober directed on May 29, 1979, that the pole be painted.

Following the recommendation of Paul Campbell, the pole was washed with a mild solution of xylene solvent, then lightly rubbed with Scotch-Brite plastic pads to remove any residue and slightly abrade the surface for painting. This consisted of a two-part epoxy primer (MIL-P-23377) and two finish coats of aliphatic urethane (MIL-C-81773). The finish coat is an extremely hard, dense coating developed for use on Navy jet fighters.

## Elongated Sphere, Consoles, and Rings

Sphere. It is not known when the existing paint was applied. Although dull and discolored, the finish appeared to have been a bright enamel originally, possibly with gold powder added for additional luster. The overpainting was crudely done, with thick streaks alternating with thin patches; the resultant appearance was made worse by deposits from air pollution.

Tests were made using small amounts of stripper and short dwell periods in an effort to remove the deteriorated paint without loosening the gold. This was not possible and the sphere was completely stripped. During the process it was observed that less than 50 percent of the sphere still bore gold leaf, and that was deteriorated.

The sphere was sound and undistorted, other than the dimpling caused by hail. The only work required was tightening the loose joint at the center band connecting the upper and lower sections. There was no damage as a result of the fire. Chemical stripper used was Klean-Strip, an alkaline type furnished by Porter Paint Company, which also supplied the paint for the contract. Another stripper of the same type, Chekr Brand, worked nearly as well and could also be obtained locally. Both products were effective on the latex top coat as well as the lead and oil earlier coats throughout the paint removal work.

Surface preparation was done to directions by Tom Sater, the gilder whose firm, Artisan Decorators, has accomplished several projects on church domes in the region. Work consisted of scrubbing the surface with two cups of trisodium phosphate per gallon of water to break loose and dissolve any remaining paint remover or dried residue; this was followed by several rinses. The final step, by Sater, was washing down with CALMAC, a mild acid.

Sater then applied by brush Graham Zinc Chromate Primer 908 (alkyd type). After 48 hours the first coat of Hastings Gold Size (oil type) was applied, followed by a second coat. Within 24 hours small strips of 23 karat gold leaf (patent leaf) were placed and burnished with wet cotton. The final step was "spinning," or "engine turning" to impart a jewel-like appearance. It is worth noting that the surface dimpling was practically invisible after the gilding.

Consoles and Rings. Paint removal at these elements was simple because much of the paint was weathered away; a light corrosion had occurred on the surface. In some difficult to reach places in the elaborate consoles, blasting with glass microspheres was used very effectively.

Originally these units were in good condition, other than the hail dimpling. However, when the fire was discovered, the firemen hacked them with axes to insert watersprays. Damage at the scrolls was relatively minor, requiring only solder repairs in several places.

Approximately one-third of the two-part base ring element required replacement by new metal soldered in place.

## Pineapple Dome

The first part above the cornice consists of two concentric vertical bands, or fasciae, the lower 1' 9" high and set 6" out from the 1' 2" high upper band which is 4" out from the lowest pineapple leaves. A small portion of the upper band required repairs to cuts made by the firemen, as mentioned earlier. The bands otherwise were in good condition, needing only removal of the minor paint residue and some corrosion in preparation for historic repainting. It should be mentioned that the rings and consoles at the top of the dome were also repainted.

The general shape and arrangement of the leaves can be seen in photo 55. There are a total of 611 leaves in 13 horizontal tiers, or courses, each containing 47 leaves. Starting with course 1 above the vertical bands, the first 11 courses are identical in form but decrease in size at each course. The leaves might be described as a "flounder" shape, the exposed lower edges forming down-turned flanges curving inward and upward to a prominent "nose" and the concealed upper edges forming up-turned flanges curving inward to form a stem approximately 3/8 of the total length. A spine, or ridge, extends along the top from the nose, with the leaf dishing down at each side. Dimensions vary subtly within each course, the largest leaves, in course 1, being approximately 16¼" long by 9-3/4" wide, with a 2½" to 3" nose; course 11 is 8½" long by 5-3/8" wide with a 1½" nose. Course 12 is similar in shape but with a very truncated stem, 6½" long by 5" wide, nose 1-3/8"; course 13 is approximately triangular, 3" long by 4" wide, nose 1¼". Course 13 butts against the base of the rings at the dome top.

The leaves were installed as an interlocking system; at each succeeding course after the first the down-turned lower flanges of a leaf being snapped over the up-turned upper flanges of the two adjacent leaves below. Leaves were secured at the top in courses 1 through 12 by a square copper nail driven through the top end of the stem and through the copper and wood sheathing. The nail puncture was covered with solder for watertightness. Course 13 leaves were fastened to the copper base of the top ring with a continuous solder bead. At the bottoms of the leaves solder was deposited in the interior of the nose, the nose pressed over the adjacent leaves below, then reheated to fuse the joint together. When the leaves were removed as described later, it was evident that a great deal of "humoring," or adjustment by cutting of the edges at the site, was necessary to make them fit.

The condition of the pineapple leaf covering system was complex. While the system was basically stable--thanks to the ingenious attachment method, which was sufficiently flexible to allow movement to accommodate thermal stress and wind pressure--the surface deterioration of individual leaves was extraordinary.

All leaves were uniformly discolored and covered with a granular corrosion, resulting from the effect of the reaction of atmospheric pollution with the copper since 1861, compounded by the interaction of these with the lead and linseed oil painting of 1942. This condition was further aggravated by corrosion from underneath, caused by moisture accumulating on the copper sheathing below the leaves. Phoebe Weil's analysis of a sample leaf revealed two coats of red lead used as a primer. In her opinion the leaves had been painted only once, and the conditions found were consistent with the documented 1942 painting.

Another uniform phenomenon was dimpling or denting by hail. Many of the leaves contained numerous pinholes, also deterioration where the edges interlocked due to accumulated moisture reacting with airborne contaminants. Six plates were missing, and a large number were loose at the lower end where the solder connections had broken. The copper sheathing visible at the missing leaves was stained a green-brown but was smooth and unbroken. Dozens of leaves were cracked, misshapen, or flattened, the latter the result of being walked on during the painting of the elongated sphere. Additional damage probably occurred when the flagpole fell in the 1870s.

As a tentative estimate, it was felt that roughly 60 to 70 percent of the leaves could be salvaged. Charles Kramer, president of Western Sheet Metal Works, Ltd., sheet metal subcontractor for the job, stated that two to three months would be required to fabricate replacement leaves. Also, he gave a rough estimate of $20,000 to reproduce all the leaves. The question of whether to clean and repair the salvageable leaves in place, or to remove them as well as the leaves to be discarded, was deferred pending consultation with several copper experts. This was arranged by Michael Hunter, project inspector; in addition to Phoebe Weil the group included James L. Hirsch - manager, Architectural Technical Services, Revere Copper and Brass, Inc.; John Foehl, Copper Development Association, Inc., an architect with experience in mill work with fabrication of architectural metals; and L. Eugene Keeven, Copper Development Association, Inc., St. Louis.

It was generally agreed that the ideal method of treatment would be to remove all the leaves to ensure the most effective cleaning and repair. Also, it was agreed to use a diluted solution of hydrochloric or sulfuric acid to clean the leaves. While this method would dissolve paint residue and other deposits, it might cause further deterioration to already thin metal. The original copper was estimated to have been 12 to 14 ounces when installed.

Phoebe Weil presented a sample leaf that had been cleaned with the glass microsphere blasting, or "peening" technique, which she said had been accomplished rapidly. A large number of pinholes and some deterioration at the edges were revealed. She also stated that a very slight distortion appeared under the microscope; however, she did not believe this affected structural stability. Peening was done with microspheres averaging 100 microns in diameter, at a pressure no greater than 40 pounds per square inch. The cleaning results were impressive. She also suggested a method of structural reinforcement consisting of a polyester resin coating on the leaf interior to which would be laminated a fiberglass sheet. The treatment would require testing through a heat cycle to determine if the laminate would hold.

In addition, Weil suggested that since the leaves were essentially decorative and not the basic waterproofing element, only minor surface repairs for acceptable appearance and cleaning were necessary. If desired, however, she offered, in addition to cleaning all salvageable leaves, to hammer out major deformations to a close approximation of the original shapes, the price being $8,500 and the work requiring seven weeks. In her opinion the leaves would last about 50 more years, and repatinate in a year or two.

Hirsch, Foehl, and Keeven disagreed with some of the above. Mainly they recommended, regardless of cleaning method, that the leaves be removed and strengthened by electroplating to increase copper thickness by 3 to 4 mils. The process would also fill pinholes and provide a good smooth surface for repatination; the latter could be done artificially, whereas natural repatination would probably take up to 10 years. Whether the old leaves were used or replacements fabricated, they should be installed with solder at the top and spring clips at the bottom to avoid puncturing of the copper sheathing by screws.

Since previous investigation had revealed no leaks inside the dome, indicating that the copper sheathing below the leaves was still sound, it was decided to clean the leaves in place, anchor loose leaves, and replace those beyond salvage. An effective method using chemical stripper was devised, in which a polyethylene sheet was placed over the coated area for 15 minutes, concentrating the action and retarding evaporation. (This procedure was developed during a research project at the Illinois Institute of Technology.) Most of the loosened residue could then be easily removed with putty knives, the remainder via the glass microsphere process. Small remnants in the hail indentations were removed with bronze wire brushes. In some cases the stripper/polyethylene treatment had to be repeated. (This technique was also applied at painted copper areas in the lower lantern.) During the paint removal process at the dome it was estimated that only about 50% to 55% of the leaves were salvageable, rather than the previously believed 60% to 70%.

The June 14 fire and subsequent actions of the firemen attempting to locate the fire and insert hoses put an end to this approach. Several large holes were chopped through the entire dome, many additional leaves were damaged by heat, and some were crushed by being walked on. Eventually it was determined that only about 30% of the total 605 remaining leaves could be reused.

All leaves and the badly damaged copper sheathing were removed, revealing that the original wood sheathing beneath had rotted as well as being partially destroyed by fire. This sheathing was composed of two layers of ¼" thick boards, cut in a tapered shape from bottom to top to fit the double curved form of the dome.

The search for an architectural metal firm that could fabricate the required replacement pineapple leaves continued, with the following results:

Henry C. Smithers Roofing Company, Indianapolis - $53,292

Kenneth Lynch and Sons, Wilton, Conn. - could not fabricate for nine months to one year - no estimate provided

Architectural Bronze Studio, Inc., St. Louis - no estimate provided, despite repeated requests

As previously stated, the sheet metal subcontractor quoted a price of $20,000. The contractor estimated all fire damage repairs--including replacement of 425 ± dome leaves--would cost $93,391 and take until September 15 to accomplish. The rotted and burned wood sheathing was replaced by two layers of ¼" thick exterior grade plywood, preservative and water repellent treated, cut to shapes matching the original pieces. The plywood sections were fastened to each other and to the wood dome framing with glue, and both layers were secured to the framing with "Hi-Lo" hardened, threaded, and coated steel nails. The plywood sheathing was then covered with asphalt felt followed by a covering of building paper, both secured with slanting copper nails. The new 16-ounce copper sheathing installed next was cut in vertical sections tapered from bottom to top matching the original, and the vertical joints were connected by loose single lock flat seams attached to the plywood sheathing with copper cleats as in the original work.

A sample reproduction pineapple leaf was fabricated by the sheet metal subcontractor and was inspected and accepted by the park, the Midwest Regional Office, and the Denver Service Center. The exposed edges were not quite so sharp as the original design, being formed of 16-ounce copper, which was thicker than the original. However, it was felt that this difference would not be visually significant at a distance, and the heavier metal in the reproductions would have a longer life.

The replacement leaves were fabricated by making a plaster cast from an intact sample of each type of leaf. An aluminum die was then formed from each cast and the respective leaves hand formed on the die. Each die was then melted down to make the next die. Accordingly, several extra leaves for future replacement were provided for each course type; also, the plaster casts were turned over to the park.

During the reproduction process outlined above, the cleaning of the leaves judged to be salvageable continued by the methods previously described. In the process of cleaning the approximately 184 remaining original leaves believed to be salvageable, the sheet metal contractor decided that their condition was marginal and they would probably not last for a great length of time if reinstalled. Accordingly, he recommended that they too be replaced by new reproductions, offering to do so at no increase over his price for 70% or 425 ± leaves. Superintendent Schober stated on March 18, 1980, that from the long-range maintenance standpoint it was in the best interest of the government to install all new copper leaves. The Midwest Regional Office concurred with this judgment, and the additional replacement leaves were fabricated and installed. The original leaves remaining were preserved for historic interpretation and as part of the old court archive.

When installed, the new reproduction leaves were attached at the top and bottom with solder, in the same manner as the original leaves. Also, the flanges had to be cut on the job, to make them fit, as in the original installation.

## Lower Lantern - Copper Areas

Cornice and Valances. The main copper repair at the cornice occurred at the 18" wide horizontal upper surface, where a section 8' long was cut by axes at the time of the fire. This was repaired by soldering, as were numerous seams where solder had melted, both in the cornice and in the bands above. This treatment was also required at several of the 3" cube shaped dentils below the cornice. All the dentils were carefully inspected and minor touchup soldering was done as required.

During repair to the 18" horizontal copper section, it was discovered that the wood decking below was rotted, as well as the wood cornice support brackets. All the copper covering and wood sheathing were removed, and 37 of the cornice supports replaced, reinforced by 2" by 4" and 2" by 6" bracing. New plywood decking was then installed and the original copper replaced. All wood was treated with wood preservative containing a water repellent. The decking was fastened with the same "Hi-Lo" hardened and coated ring nails used on the dome sheathing. Like the dome sheathing, the decking was covered with asphalt felt followed by building paper before the copper was applied.

Rotted wood sheathing was also discovered beneath the curved copper valances covering the tops of the cast-iron glazed grids, between each pair of columns below the entablature. All valances were removed and the deteriorated sheathing at each location replaced by treated 3/4" exterior grade plywood. The copper valances were then reinstalled using brass ring barb, or ring shank nails, coated with sealant before painting. Sealant was also applied at the juncture of the valances and the cast-iron glazed grids.

Base Section. The copper covering of this element was wavy in many areas, especially at the sloping section below the columns. This was because there was generally no sheathing behind it, the copper being fastened directly to 2" by 4" studs or blocking. The major job was repair or replacement of more than 50% of the copper cap flashing at the quarry tile walkway. Only a few scattered solder repairs were required elsewhere. A great deal of soldering had been done in previous years, most of it during the 1955 repairs. A few small repairs were done by riveting to provide additional strength. A larger than expected amount of sealant was applied, where joints or seams had opened but where flexibility was required. The material used was a polysulfide sealant by Pecora Corporation, based on polysulfide polymers produced by Thiokol Corporation. It was used because of its durability and its adaptability to varying substrates. This sealant was used throughout the job.

Casement Windows. It was determined that only four windows would have to be replaced--the sash that had been seriously damaged when the firemen pried them off their hinges to gain access. The sash were fabricated using as a template one sash which is from an early period, if not actually original to the lantern. The model sash and the one directly opposite were not replaced because of their relatively good condition and also because the park may wish to remove them and install electric exhaust fans. Two such fans are already in place in the openings 90° from the two openings described.

The sash were glazed with ¼" heat-strengthened glass, and equipped with continuous hinges, heavy latches, and weather-stripping. Two deteriorated sills were also replaced. Paint was stripped from the two remaining sash and all frames, minor repairs were made, the glass was cleaned, and the sash and frames were repainted after applying sealant at the frames. Loose copper at the frames was refastened with brass ring shank nails.

Paint Removal. This process was accomplished for the most part using Klean-Strip chemical remover, putty knives, wire brushes, and in some cases with the addition of polyethylene film. Glass microsphere blasting was used principally on the dentils and adjacent elements under the cornice, and it proved to be both safe and very effective. As suspected, fine sandblasting could not be used because it caused distortion of the metal.

## Lower Lantern - Cast Iron

Columns. These elements and the flanges connecting to the glazed grids were cleaned by sandblasting, using a fine crystalline silica talc sand, 100% passing a no. 100 sieve, at 60 psi pressure. Paint was quickly and completely removed, leaving the metal a beautiful light gray, as though it had just been cast with no surface damage. The columns were prime painted as soon as cleaned to prevent rust buildup.

Numerous cracks and holes were filled with a special compound called Putty-Type Plastic Steel A, manufactured by Devcon Corporation of Danvers, Massachusetts. It consists of 80% fine steel particles and 20% epoxy resins and modifiers, and it can be applied and troweled smooth with an ordinary putty knife. After hardening it can be ground, drilled, etc., like ordinary steel. Phoebe Weil, who had experience with the material on cast iron at the old state capitol in Sacramento, California, assisted with the application.

All four corners of all column capitals were cracked due to settlement of the iron ring plate above. The cracks were filled with plastic steel, and the corners were anchored with countersunk slotted brass screws and sealed. A large section of one capital that had broken off several years before was replaced and anchored the same way.

Glazed Grids. The eight grid sections set between the columns are each composed of three vertical elements 3' 1" wide by 3' 3" high, bolted to special cast-iron jamb flanges at the columns. Each grid section contains 75 glazed openings in the form of a modified octagon 7½" in size, for a total of 600 openings. At the interstices of the octagons are 56 diamond-shaped 2" by 2" openings per section, for a total of 448 openings. At the heads, jambs, and sills of each section are combined 36 triangular 1" by 2" openings, for a total of 228 openings. Thus, each section contains 167 openings of three types; the grand total for all sections is 1,336 openings.

As mentioned earlier in this report, the tops of the glazed grids were covered in the 19th century with rounded copper valances over wood sheathing. These semicircular forms were repeated at the inside in plaster, and plaster jambs for unknown reasons were extended past the grid jambs to the glazed areas. All this material had to be removed to make the grids completely accessible for inspection and necessary corrective treatment.

Removal of glass so this work could be done was severely complicated by the condition of the glazing material. The first material, lead putty, had dried and hardened to a nearly cement-like consistency. Above this various asphaltic and tar-like substances were added over the years. The most recent coat was a hard, thick enamel, possibly a Rustoleum product.

Heat methods and strippers were not effective; in particular, they had little impact on the hardened putty. Glazing material accordingly had to be removed with small chisels and other hand tools. Despite careful work and conscientious attention by the project inspector, glass breakage occurred.

Breakage also occurred because of the condition of the glass. Much of it was thin, i.e., single strength 1/16" thick. Older glass was nipped at the edges in cutting to size rather than being scored as in current practice; it was also brittle from age. In addition, many lights were irregular in shape, wedged tight against the rabbet frames without proper clearance. Approximately 100 lights were discovered to be broken or cracked before the removal work started.

Anticipating problems in replacing this glass intact in the grids after they were cleaned and repaired, the contractor offered to install new glass as specified in all of the openings for $2,261, a remarkably low price. The glass removed would then be analyzed and the historic glass retained as part of the old courthouse archive. However, this proposal was not accepted, mainly on policy grounds since the historic glass would thus be removed from its original setting.

Approximately 50% or about 670 lights of glass were destroyed as a result of the fire, which occurred after the contractor's offer. A small amount of damage was due to the fire itself, but most was caused by smashing of glass by the firemen, or breaking or cracking caused by lightning blasts which struck both the scaffolding and the lower lantern structure.

After removal of all glass the grids were sandblasted, as described for the columns. A small number of shallow holes and a great many expansion cracks, generally 1/16" to 1/8", were filled with plastic steel. A 3" long piece which had broken out was replaced with plastic steel and concealed screws in drilled and tapped holes. All iron was prime painted immediately after repairs and sealant applied at the jambs and sills.

The salvaged glass was reinstalled after careful cleaning, filling about 1-2/3 sections. It should be noted that much of the glass that was broken was not original glass but later replacements. Remaining openings were filled with ¼" float glass by PPG Company. All glass was set with M242 glazing compound manufactured by Pecora Corporation, the same firm that furnished the sealant used on the project.

Originally it was intended to use heat-strengthened glass to ensure longer life. However, this was not possible due to an unacceptably long delay in delivery and a great increase in price.

Ten lights of each glass pattern were provided for future replacement.

## Cast-Aluminum Balustrade

The balustrade was disassembled at the beginning of the contract work to permit erection of scaffolding. Its several hundred parts were marked sequentially to ensure reinstallation in the proper order and removed to the southwest service courtyard.

Fabricated in 1955 from molds obtained from the cast-iron original, the balustrade was composed of cast aluminum, minimum ¼" thick, Alcoa 43 alloy, medium sandblast finish (G3). When cleaned as described below the material was a very light silver gray. Apparently, this was considered close enough to the white color of the original painted cast-iron balustrade to eliminate the need to paint the aluminum reproduction. Unfortunately, the highly reactive metal turned over the years to a very dark gray from the effects of airborne contaminants.

The metal was scrubbed with detergent, which removed much of the dirt and lightened the color. Stubborn areas were treated with wire brushes. After repeating the process many oxidized areas still remained, which was feared would make good paint adhesion uncertain and also cause staining. Project architect Henderson then sought advice from conservator Phoebe Weil, who in turn consulted with a specialist of the Reynolds Aluminum Company. It was agreed that the most positive method to clean the aluminum to ensure a sound surface for painting without the danger of adverse chemical reaction would be by sandblasting.

A test was performed on the interior surfaces of several elements, with the same sand used to clean the cast-iron columns but at a lower pressure, 40 to 45 psi. All remaining dirt and oxidized deposits were removed, exposing the light gray color previously described. The metal surface had an even granular texture, without cuts, pitting, or other blemishes. While conjectural, it may be presumed that the finished appearance was probably quite similar to the original sandblasting.

There were no cracks or holes in the many components, eliminating the anticipated need for repairing with plastic aluminum, an epoxy compound similar to the plastic steel used at the cast iron and also manufactured by Devcon Corporation. A few missing screws at the surface were replaced. The metal was primed and finish painted and stored awaiting reinstallation.

## Dome Interior Fire Damage Repairs

The basic dome structure begins with a horizontal cast-iron ring plate at the bottom of the cornice, supported by eight pairs of wrought-iron I-columns rising from the main dome structure through the circular cast-iron ornamental columns. From the plate ascend eight sloping wrought-iron T-ribs, terminating at a flanged cast-iron compression drum at the level of the concentric rings below the consoles and sphere. Cast-iron X-braces provide lateral stability between the lower halves of the ribs. Recently installed steel beams supporting the flagpole span the bottom of the dome and bear on the horizontal ring plate.

The dome shape is established by curved 2" by 6" wood ribs stiffened by 2" by 6" blocking, or wales, approximately at the eighth points. The ribs spring from a compound wood sill just above the iron ring plate and frame into the compression drum above the iron T-ribs. The floor consists of 1" random width boards on 2" by 8" wood joists 16" to 18" o.c. and bearing on the wood sill carrying the curved wood ribs.

A lightning protection system had been installed, presumably with the 1971 flagpole installation. It consisted of a 5/8" stranded copper cable attached to the flagpole base and bonding conductors attached to several points on the iron ring plate. However, one conductor was faulty, and during a lightning strike the electrical charge arced, igniting the dry wood. As electrical engineer Roy Kohen has pointed out, the main charge did go to ground via the cast-iron structural system below. Lightning also struck the scaffolding and then jumped to the lantern structure.

Due to the low oxygen level in the dome, the fire smoldered for several days instead of burning normally. The following repairs were required to correct the damage:

- replace eight wood ribs that were totally destroyed
- replace upper portions of nine ribs above splice
- replace burned horizontal blocking between ribs
- replace 25% of burned wood sheathing over ribs (as described earlier, all sheathing was replaced because of rot as well)
- replace 5± lineal feet of wood sill carrying ribs
- replace all floor decking
- replace 7' ± each of four 2" x 8" floor joists
- repair cracks in two X-braces with splice and filler plates

New 2" by 6" splices were both glued and screwed to the sound original and new rib sections. All wood was preservative treated by the Wolman process.

The entire lightning protection system was thoroughly checked and necessary adjustments or corrections were made. Smoke/heat detectors were installed in the dome interior, on the plaster ceiling below, and in the main dome. These were wired to an alarm buzzer at the fourth level gallery.

## Painting

Treatment of the flagpole and elongated sphere has already been described; the following specifications cover painted copper, aluminum balustrade, cast iron, and wood. They were prepared in consultation with Paul Campbell of the National Bureau of Standards. Two finish coats were applied to all surfaces.

prepainting wash primer for copper and aluminum:
FS TT-C-490 (formerly MIL-P-15328)

primer for copper and aluminum: zinc-chromate, alkyd type
FS TT-P-645

primer for iron: zinc yellow-iron oxide base,
FS TT-P-57, Type III

primer for wood-casement windows: alkyd,
MIL-P-28582

primer coating for sealant:
FS-TT-P-38

primer, alkyd, for glazing compound: Porter Paint Co. No. 565

wood preservative: Kem Penta Wood Preservative, with water
repellent--Sherwin Williams Co.

finish paint for all surfaces: alkyd oil paint,
MIL-P-52324

Finish paint colors were dark green, Munsell color no. 2.5G 2/4, for the cast-iron glazed grids and the wood casement windows; and off-white or ivory, Munsell color no. 5Y 9/1, for painted copper, cast-iron columns, and the aluminum balustrade.

### Plaster at Lantern Interior

This work is included in this addendum because it was part of the construction contract, although it is not an exterior element. It was required in order to replace metal lath and plaster removed during investigation prior to the contract and to permit work on the interior portions of the cast-iron grids.

The existing lath and plaster had been installed in 1955 to completely replace badly deteriorated earlier plaster and wood lath. During the Woermann contract, new blocking was added to replace or strengthen weakened sections of the existing studs and blocking. New metal lath was then installed.

New plaster work closely followed the 1955 specification for sand finish gypsum plaster. A bonding coat was added to ensure good adhesion at the meeting edges of the old and new material.

The entire lantern was then repainted a pale aqua color to match the existing color. Also repainted in the same location were the gold stars on the domed ceiling; these had been placed there in 1955 at the direction of Walter Nitkiewicz, NPS painting conservator. He was principally involved at that time in cleaning and restoring historic paintings in the domes below; the lantern and other color schemes at lower levels were designed by John A. Bryan, then the resident architect at the old courthouse.

## PHASE II: CONSTRUCTION CONTRACT

This account of the construction work covers the portion accomplished in phase II, which rehabilitated the exterior surfaces from the base of the lantern to the main roof of the courthouse, including the lantern balustrade, main dome, and upper and lower drums. This description details the actual conditions found and the final corrective treatment applied.

Rehabilitation was accomplished by a fixed-price contract (no. CX 6000-0-9003) by St. Louis Tuckpointing and Painting Co., Inc., of St. Louis. NPS representatives were project supervisor Charles E. Rennison, assisted by project inspector Thomas P. Busch, and project historical architect David G. Henderson. The site representative for St. Louis Tuckpointing was E.J. Holley. Work commenced on September 15, 1980, and was completed on August 28, 1981.

An unusual problem of this project was the need to erect scaffold upon elaborate shoring to accommodate the peaks and valleys of the courthouse roof. The scaffold was then secured to the structure by use of a steel cable which surrounded the building. It entirely eliminated the need to set anchors into the historic structure. Around the curved main dome, a rope and harness were used to inspect and repair damage to the copper.

A general description of the work included paint removal and cleaning at the masonry surfaces of the drums, cast-iron columns, and copper of the dome base; repair, partial resetting, repointing, and sealing of stone masonry; repair patching and sealing of copper dome, gutter, base, and cast-iron columns; partial replacement, repair, and reglazing of wood windows; installation of new downspouts; installation of the cast-aluminum balustrade (removed, cleaned, and painted in previous contract); and repainting of historically painted areas.

The limestone masonry surfaces of the drums were cleaned using walnut shell blasting. It was found that a pressure of 80 psi was adequate to clean most sound stone in a reasonable amount of time with no apparent damage to the stone. There were some areas, however, where a thin layer of "stone scale" was removed with the paint, regardless of the pressure applied. It appeared that the paint was the only support that held these layers to the building. It was resolved that the main objective in cleaning the structure was to provide a sound surface suitable for repainting. To achieve this, the fragile, unstable layer of stone had to be removed or efforts to preserve the building with a protective as well as aesthetically pleasing layer of paint would not last.

The cleaned stone color was darker than when it was painted, making the building appear dirtier after cleaning than before. The cleaning also exposed the variations in color of stones, seams, cracks, spalling, and other imperfections. Even on sound stone not all the paint was removed. Some paint was so well adhered that damage to the stone would have occurred and an unreasonable amount of time would have been used to remove it.

While accomplishing the cleaning, using the prescribed procedures, a much larger amount of unsound stone was found than originally anticipated, and if it was to be dealt with in this contract, a change in cleaning procedure was required. An inspection trip was made to the site by Jim Askins and Dave Henderson to determine what changes were necessary. It was found through testing that the scaled unsound stone could be adequately removed using a pressure of 100 psi; however, it took five times as long as removing the scale by hand-scraping methods. After much discussion, the hand method of stone scale removal was adopted; however, this method left a thin film of limestone powder, dirt, etc., under the stone which could affect paint adhesion. This was later removed using a water wash down. A psi of 12 was used (direct from the tap) and proved effective; however, a psi of 40 was then recommended. This altered procedure added cost to the contract.

To clean the cast-iron columns of the upper drum, sandblasting at approximately 100 psi with a 3/8" nozzle proved effective with no apparent damage to the columns. The first cleaning was done in December. The columns had to be cleaned a second time because they were exposed to the weather through the winter and had built up a coat of rust. The surface rust was sandblasted in April, and cracks and holes greater than ¼" were patched with epoxy steel and painted with a primer to protect them.

Copper work was cleaned using chemical stripper and a water rinse. Once cleaned, holes in the copper were repaired using 2" diameter soldered copper patches. Bullets were found still lodged in the dome. There was much more damage than originally anticipated. The line item for copper patching was overrun. A change order eventually had to be issued to repair these additional tears, splits, and punctures. Repairs were made with sealant, which was determined to be effective but less costly than copper patching.

Porter Paint Co., the supplier of paint for this project, recommended various changes in the types of paint from those that were specified for use on limestone masonry and cast-iron columns.

On exterior masonry surfaces (limestone) a prime cost of TT-P-19C paint, acrylic emulsion, exterior with a finish coat of MIL-P-52324 paint, oil alkyd exterior white and light tints were specified. The masonry limestone surface was cleaned with a blasting process to remove all the old paint coatings, leaving the exposed surface porous and soft. TT-P-19C is an acrylic emulsion coating, and it would bridge over this surface and penetrate only minutely into the surface. Under these conditions the prime coat would have questionable adhesion, because a primer that does not penetrate and fortify the surface allows moisture to get into the soft limestone surface. When this happens, spalling will take place during the winter season.

The recommended paint to replace the specified primer was Porter #898 bonding coat. Its vehicle is an epoxy ester. This gives it excellent alkali resistance and good penetration. Paint #898 must be thinned according to the porosity of the surface in order to avoid a built-up film on the surface. The desired effect is to penetrate and fortify the surface. This prevents moisture from entering and gives the finish coat a good sound surface to adhere to.

The finish coat was also changed from an oil alkyd system to an acrylic emulsion system in a flat finish. The reason for this change was that acrylics give much better exterior durability in regards to chalking, color, and gloss retention.

On the cast-iron columns one coat of TT-P-1757 primer and two coats of MIL-P-52324 finish coat were specified. After one coat of primer was applied to the columns, rust soon began to penetrate at the sharp-fluted edges. It was therefore recommended that a second coat of primer and one coat of finish be applied in lieu of two coats of finish. Since the finish coat was changed from an oil alkyd to an acrylic emulsion system, the primer on the metal columns was also changed. Porters #515 acrylic primer, which retards rust staining better than oil-based primers, was used.

To protect the top of the cornice of the upper drum from further deterioration from exposure to the weather, it was decided that a sloped topping material should be applied to this relatively flat and spalled surface. It was determined through recommendations from the manufacturer that Sika Top 122 would be appropriate for use at this location. Prior to the implementation of this additional work, the original contract work of lead joint caps set in sealant at the horizontal cornice stone joints was completed.

The topping was applied according to manufacturer's instructions for thickness of coverage, cleaning, and preparation of surface, weather conditions, and priming of the surface. Special precautions were taken to pitch the surface to the outside edge and avoid any abrupt changes in thickness, being certain to fill all voids and low spots to provide positive water runoff. This was one of the last items completed prior to final inspection of the project.

Within two months of the application of the Sika Top 122, the surface of the cornice formed a network of cracks. It also soon released itself from the surface, creating loose pieces of material that could fall to the roof below. Before any damage occurred to the courthouse, the Sika Top material was removed. This was not a difficult task since all the material had released itself from the surface of the cornice and had cracked into manageable pieces.

The manufacturer was consulted about the failure of the material and responded that although it appeared that the Sika Top 122 had been mixed properly it had not been worked into the substrate and the substrate had not been cleaned to a ±1/16" surface profile. The manufacturer claimed it was these conditions that caused loss of bond. The project supervisor believed that the substrate had been prepared properly and that the material had been applied in strict accordance with the manufacturer's instructions. It is now believed that the material recommended was not proper for this particular application. Because the cornice had been previously sealed and further work due to the failure of the Sika Top was not contemplated at this time, the top surface of the cornice was simply painted as originally specified.

Because of the aged and deteriorated condition of the reglet at the base of the octagonal drum, a change was made for cleaning and resetting the reglet.

The following is a list of overrun or underrun line item amounts from the contract bid schedule.

Item 4 - 138 CF ($22,632) underrun for resetting cornice and ledge stone. There was less than expected.

Item 9 - 6 each ($1,590) underrun for the repair of cast-iron bases. Bases were stone - not cast iron.

Item 15 - 125 LF ($2,490) underrun for loose lock expansion seams. Repairs not needed.

Item 16 - 4 LF ($156) overrun for soldered seams. More than estimated.

Item 17 - 120 LF ($2,160) underrun for unsoldered seams. Repairs not needed.

Item 18 - 165 each ($19,635) overrun for copper patching. Damage to copper was more extensive than anticipated.

Item 19 - 300 SF ($6,900) underrun for copper replacement. Replacement not required.

Item 20 - 100 LF ($750) underrun for riveted joints. Repairs not needed.

Item 37 - 15 CF ($4,980) underrun for stone replacement. Work not necessary.

## BIBLIOGRAPHY

ADVISORY COUNCIL ON HISTORIC PRESERVATION

1985 "Regulations for the Protection of Historic and Cultural Properties," Code of Federal Regulations, title 36, part 800.

COUNTY OF ST. LOUIS, ST. LOUIS COUNTY COURT

1963 "Contract and Specifications for Painting the Exterior of the Courthouse."

DOSCH, DONALD

1979 The Old Courthouse--America Builds a Forum on the Frontier. St. Louis: Jefferson National Expansion Memorial Association.

HAROLD RUSSELL ASSOCIATES, INC.

1979 Accommodation of Handicapped Visitors at Historic Sites. 2 vols. Prepared for the National Park Service.

LINDENBUSCH, JOHN H.

1982 "Historic Structure Report, Historical Data Section - Part 1: Historic Grounds Study, Old Courthouse." Prepared for the National Park Service.

NATIONAL BUREAU OF STANDARDS

1978 Final Report: Restoration of the Old St. Louis Courthouse, by J.R. Clifton, P.W. Brown, and P.G. Campbell.

NATIONAL PARK SERVICE, U.S. DEPARTMENT OF THE INTERIOR

1934 Historic American Buildings Survey, District 31, Survey No. 31-8, Measured Drawings. NPS Drawing No. 27,001A (50 sheets). On file at Denver Service Center.

1937 "An Architectural and Historical Sketch of the Old Courthouse," by John A. Bryan. On file at Jefferson National Expansion Memorial National Historic Site.

1938 "A Physical History of the Old Courthouse, St. Louis, Missouri, 1826-1938," by John A. Bryan. On file at Jefferson National Expansion Memorial National Historic Site.

1940 "Specifications and Drawings for Constructing and Erecting a New Roof on the Old Courthouse," by John A. Bryan. Contract No. I-IP-5974. On file at Jefferson National Expansion Memorial National Historic Site.

1941 "Old Courthouse Painting," by Charles E. Peterson. Memorandum. On file at Jefferson National Expansion Memorial National Historic Site.

NATIONAL PARK SERVICE, U.S. DEPARTMENT OF THE INTERIOR

1941- 1978 Correspondence files. On file at Jefferson National Expansion Memorial National Historic Site.

1942a "Specifications for Painting the Exterior of the Old Courthouse." Contract No. I-IP-17968. On file at Jefferson National Expansion Memorial National Historic Site.

1947 "Contract for New Copper Dome." Contract No. I-24-NP-13. On file at Jefferson National Expansion Memorial National Historic Site.

1956 *The Rotunda 1839-1955: Its Changing Styles of Architecture, Its Historic Events and Mural Paintings, Its Restoration*, by John A. Bryan. Jefferson National Expansion Memorial National Historic Site.

1974 "Development/Study Package Proposal: Historic Structure Report - Architectural Investigation of Old Courthouse at Jefferson National Expansion Memorial to Determine Structural Weaknesses, Package No. 160." Denver Service Center.

1975 "Survey of the Condition of the Old Courthouse," by D. Arbogast, T. Busch, and R. Ortega. 4 vols. Midwest Regional Office, Omaha.

1976a "Task Directive: Preservation of the St. Louis Courthouse, Package No. 160," by Curtis Lester. Denver Service Center.

1976b "Construction and Architectural Chronology of the Old Courthouse, 1822-1971." Denver Service Center.

1976c "Construction and Architectural Chronology of the Old Courthouse, 1822-1971," by Curtis Lester. Revised. Denver Service Center.

1977a "Historic Structure Report - Architectural Data Section: Water Intrusion (Wing Roofs)," by Curtis Lester. Denver Service Center.

1977b Specifications and Drawings for Roof and Roof Drainage Repairs, Package No. 202. Drawing No. 366/25,000. Denver Service Center.

1978a "Development/Study Package Proposal (Form 10-238), Rehabilitate Exterior of Old Courthouse (Revision No. 1), Package No. 201." Denver Service Center.

1978b "Management Policies." Washington, D.C.

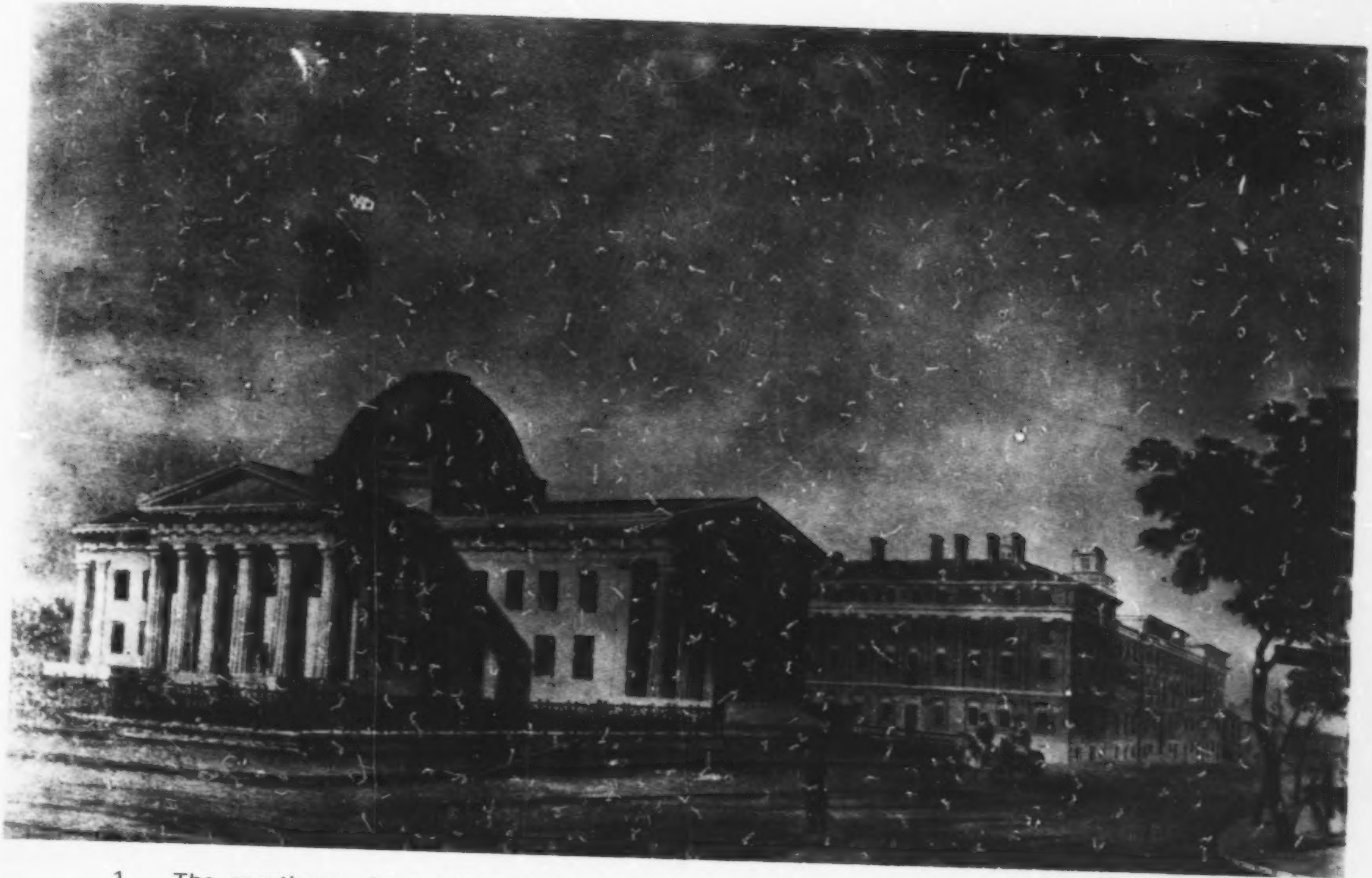
1979a "Description and Evaluation of Paint Removal and Cleaning Methods Tested at Old Courthouse," by David G. Henderson. Denver Service Center.

1979b "A Conservation Study on the Evaluation of Techniques for Paint Removal from the Exterior Surfaces of the Old Courthouse." North Atlantic Regional Office, Boston.

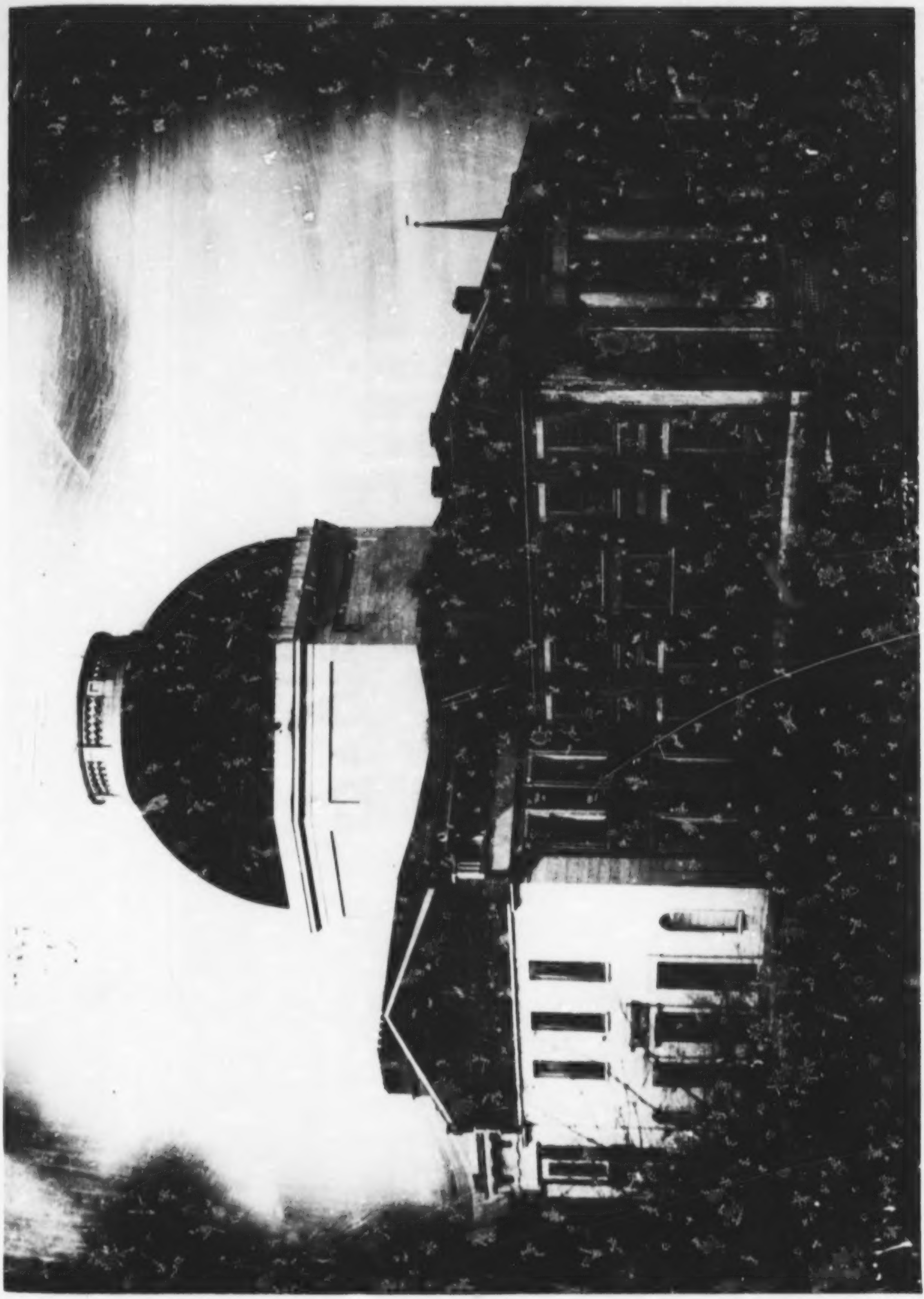
1980a "Addendum, A Conservation Study on the Evaluation of Techniques for Paint Removal from the Exterior Surfaces of the Old Courthouse." North Atlantic Regional Office, Boston.

1980b "Cultural Resources Management Guidelines." NPS-28. Washington, D.C.

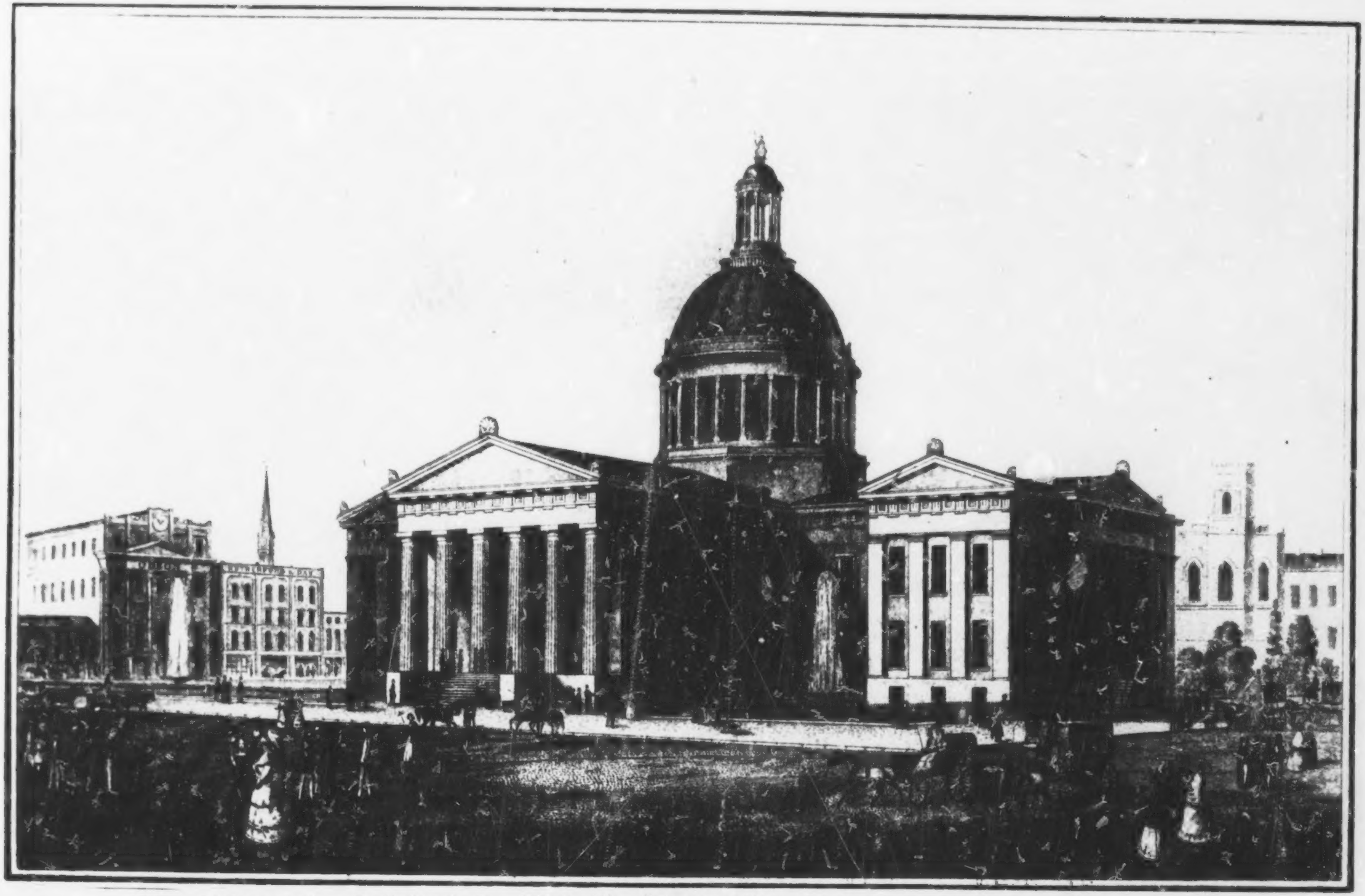
WINKLER, ERHARD M.
1977 Report on Old St. Louis Courthouse.



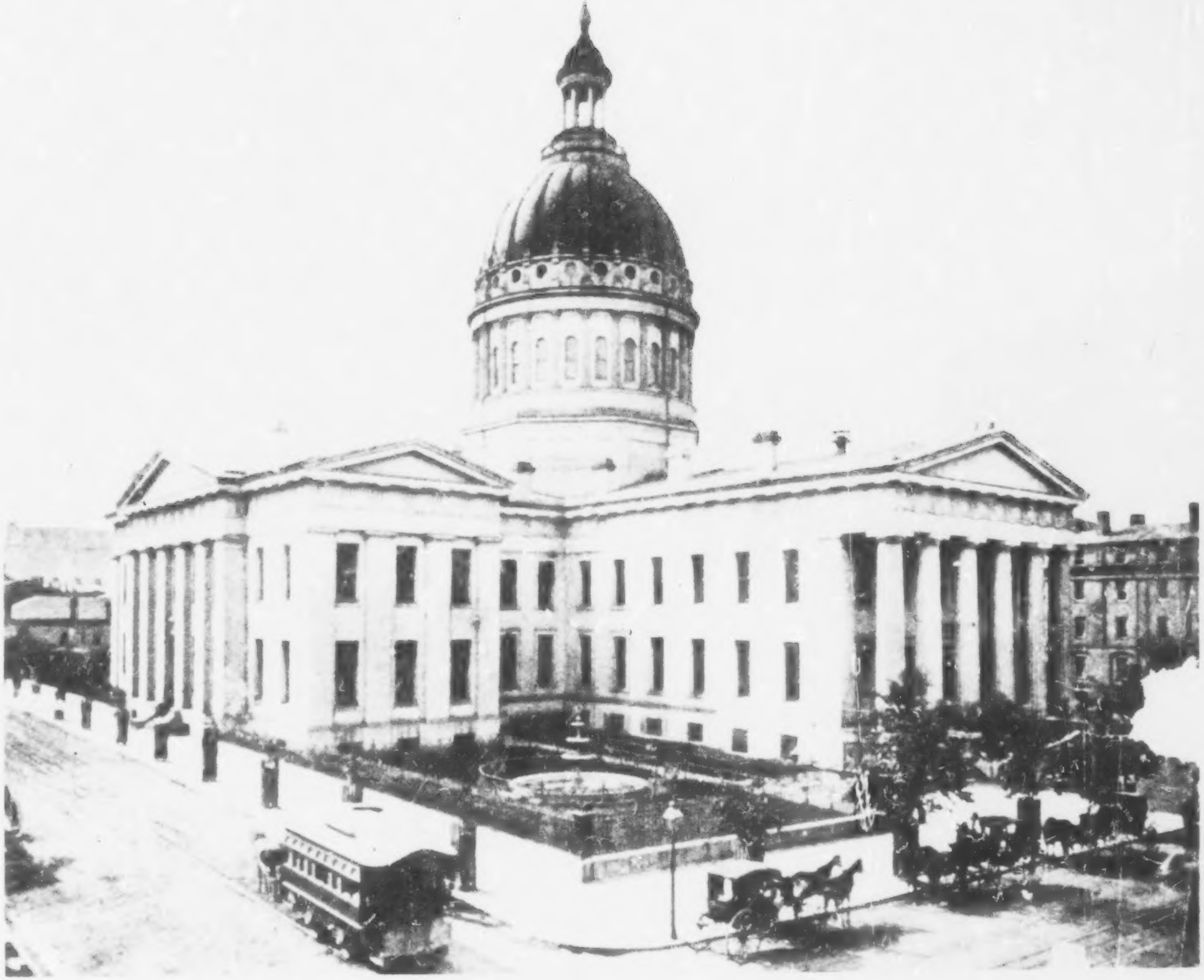
1. The courthouse from J.C. Wild's "Valley of the Mississippi Illustrated, 1840," based on Henry Singleton's sketch and showing the original intent to create porticoes at the north and south extensions.



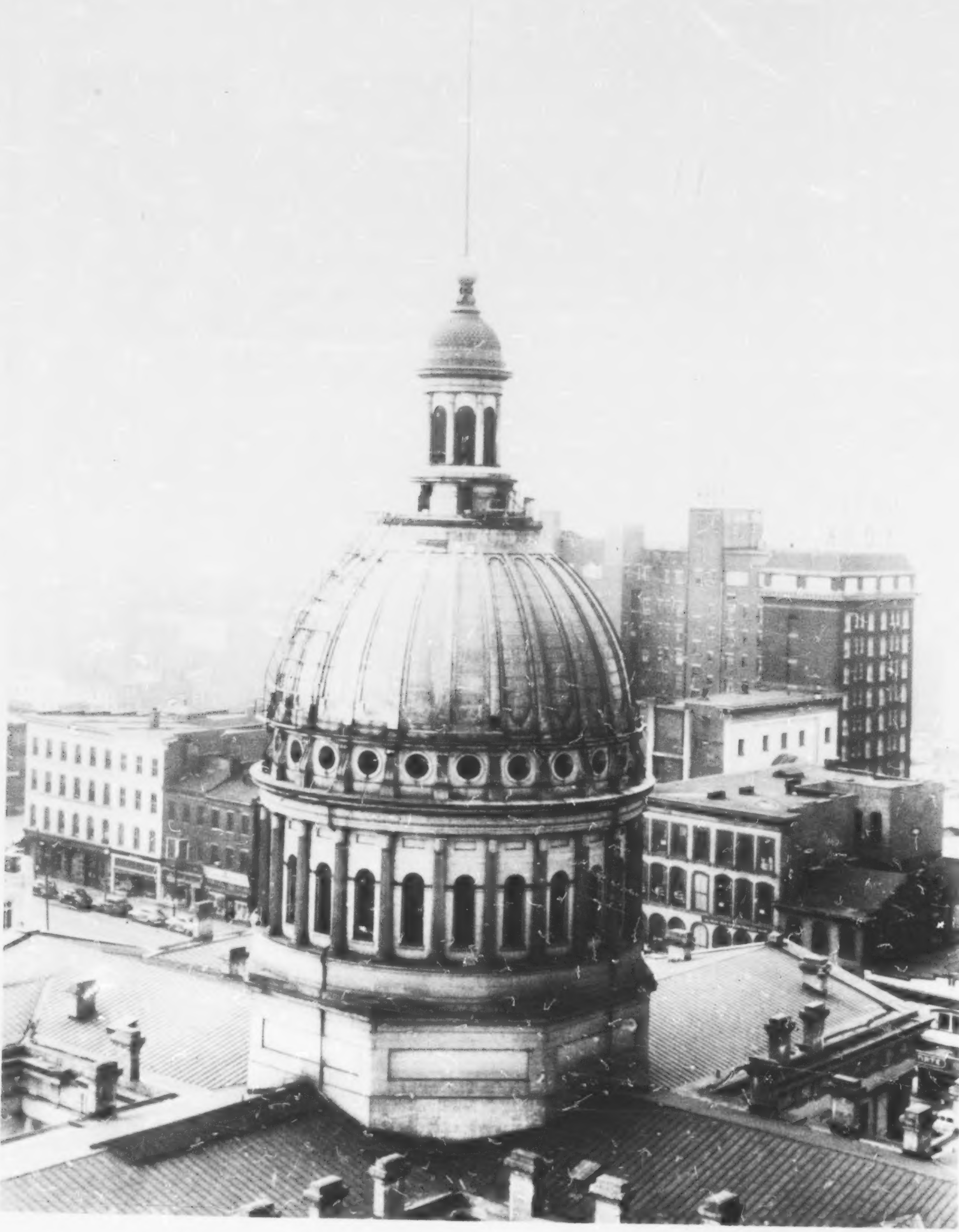
2. Exterior of the courthouse, 1845/1846. From an original daguerreotype.



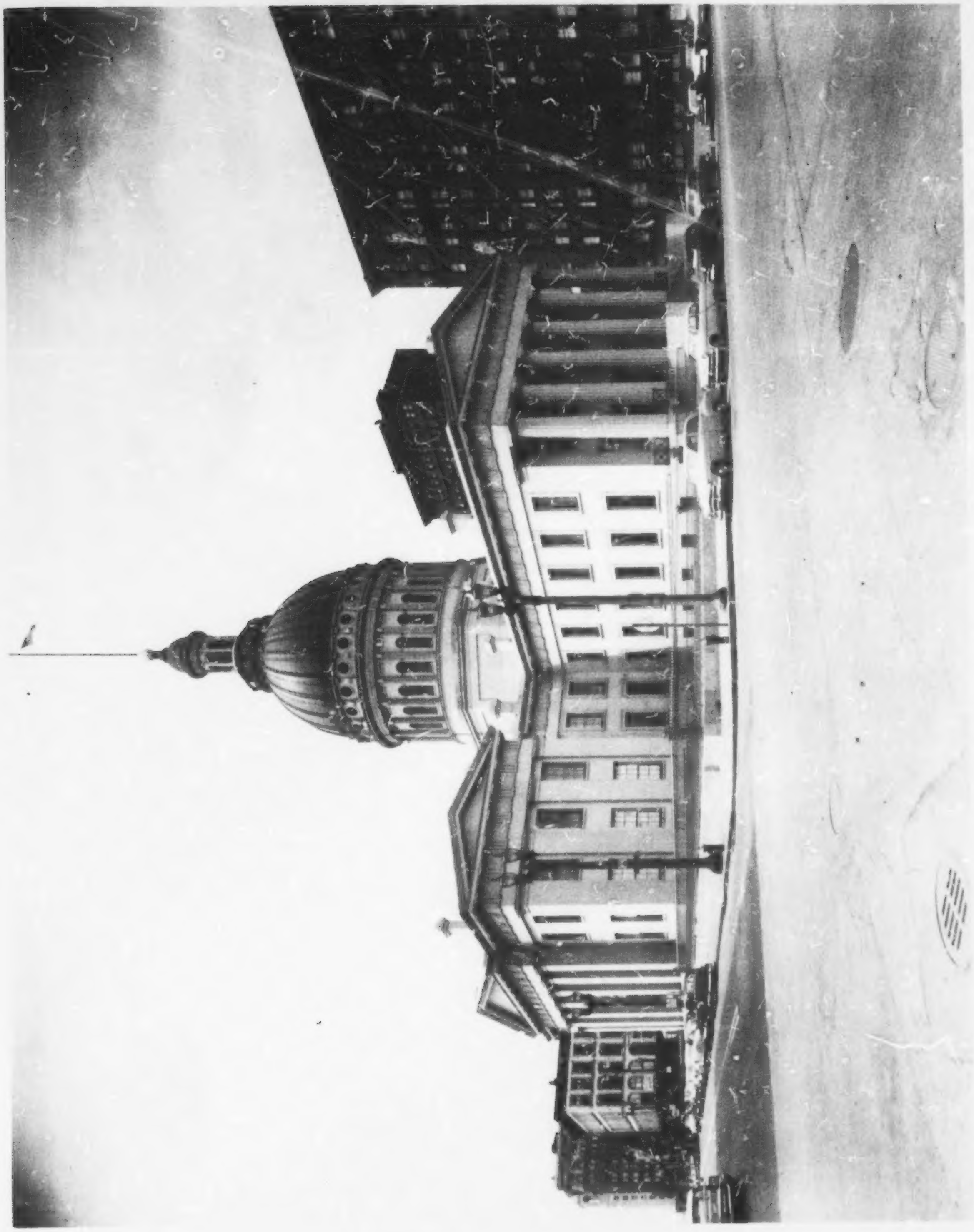
3. Lithograph of Robert S. Mitchell's "Perspective Rendering of the Courthouse, 1854." The illustration indicates that the general form of the building at its completion in 1861 had already been determined.



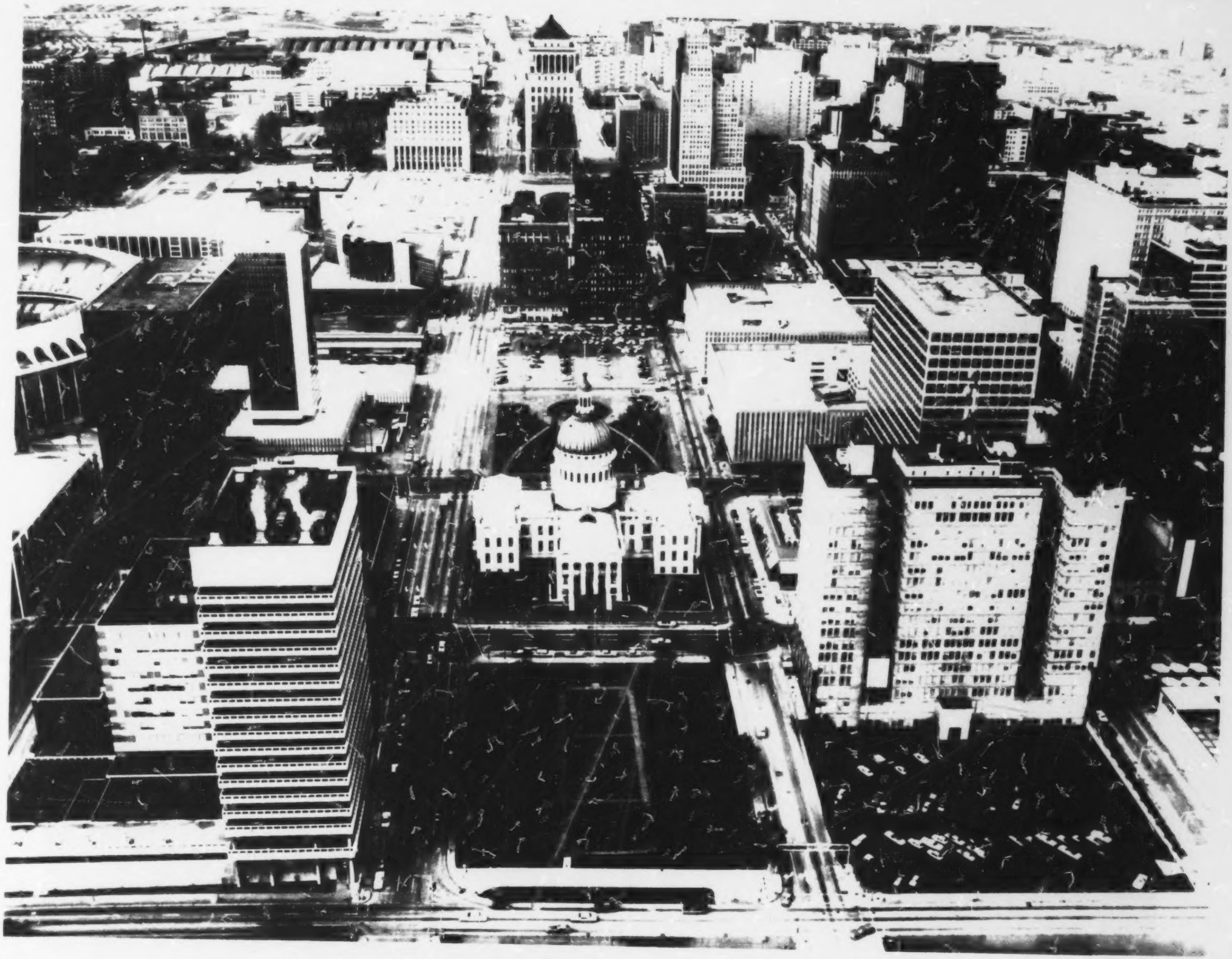
4. Courthouse from the southeast, ca. 1866 photo.



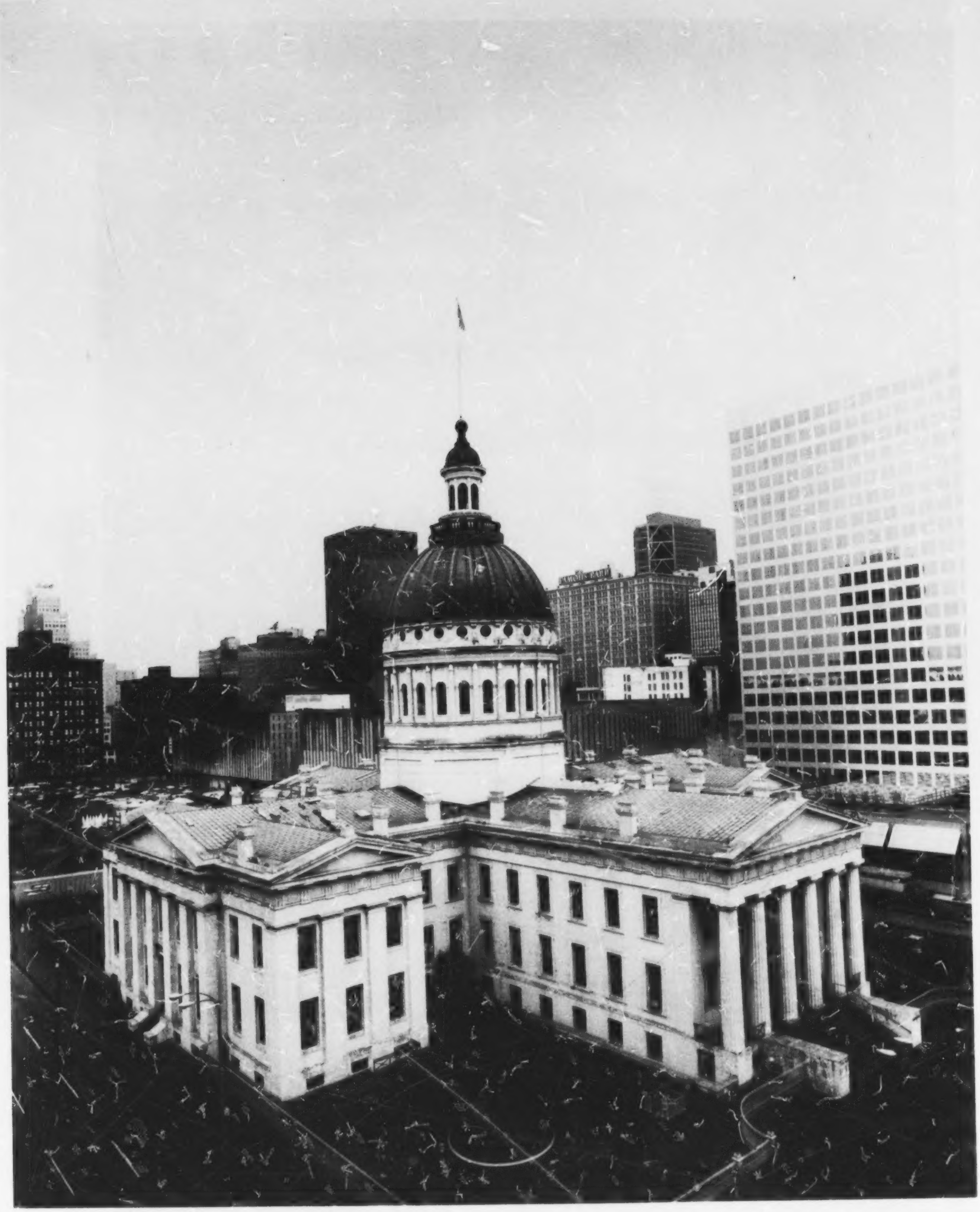
5. Applying new copper over dome. Photo looking southwest, January 17, 1948.



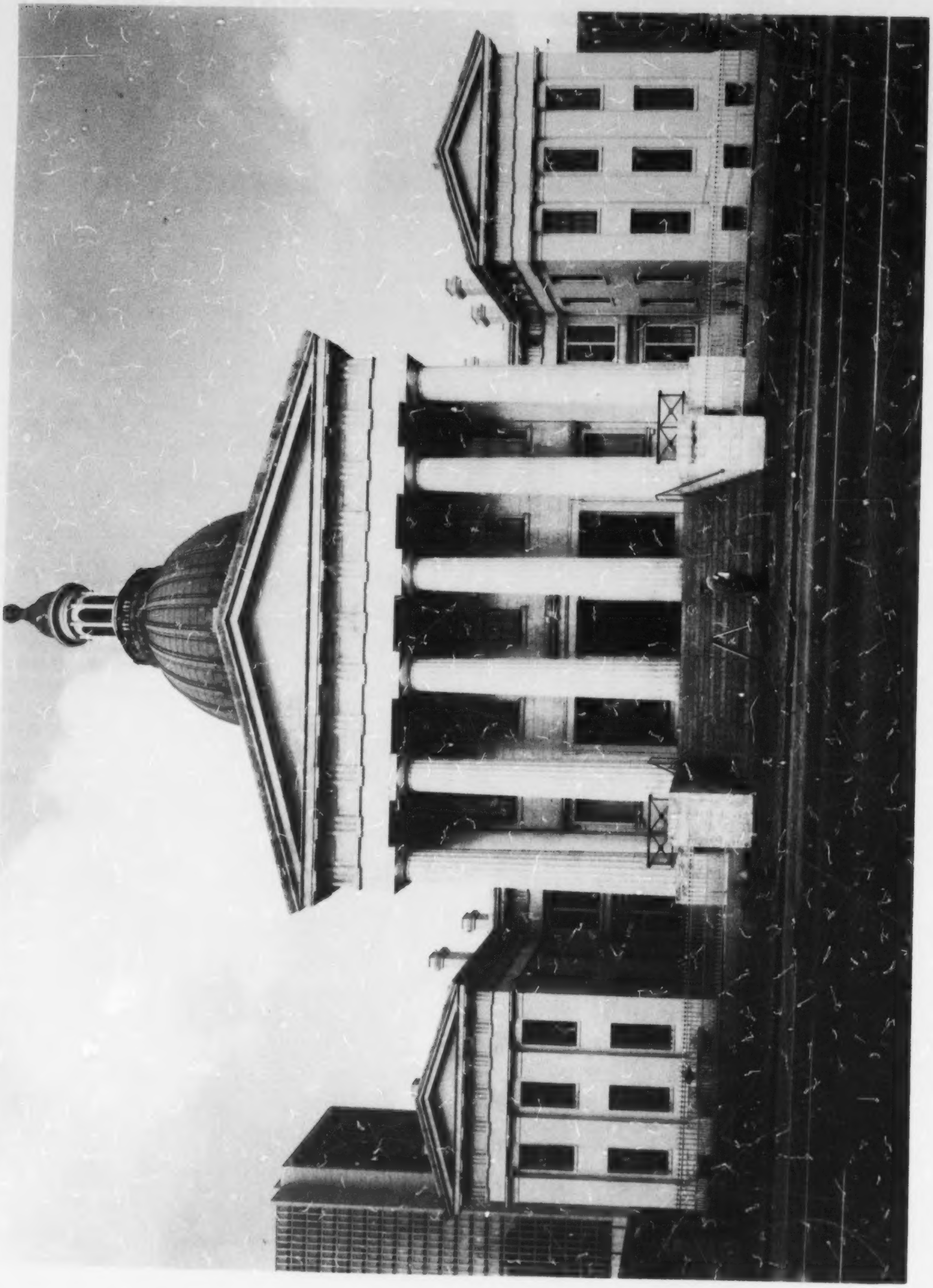
6. Courthouse from the southeast, July 1957.



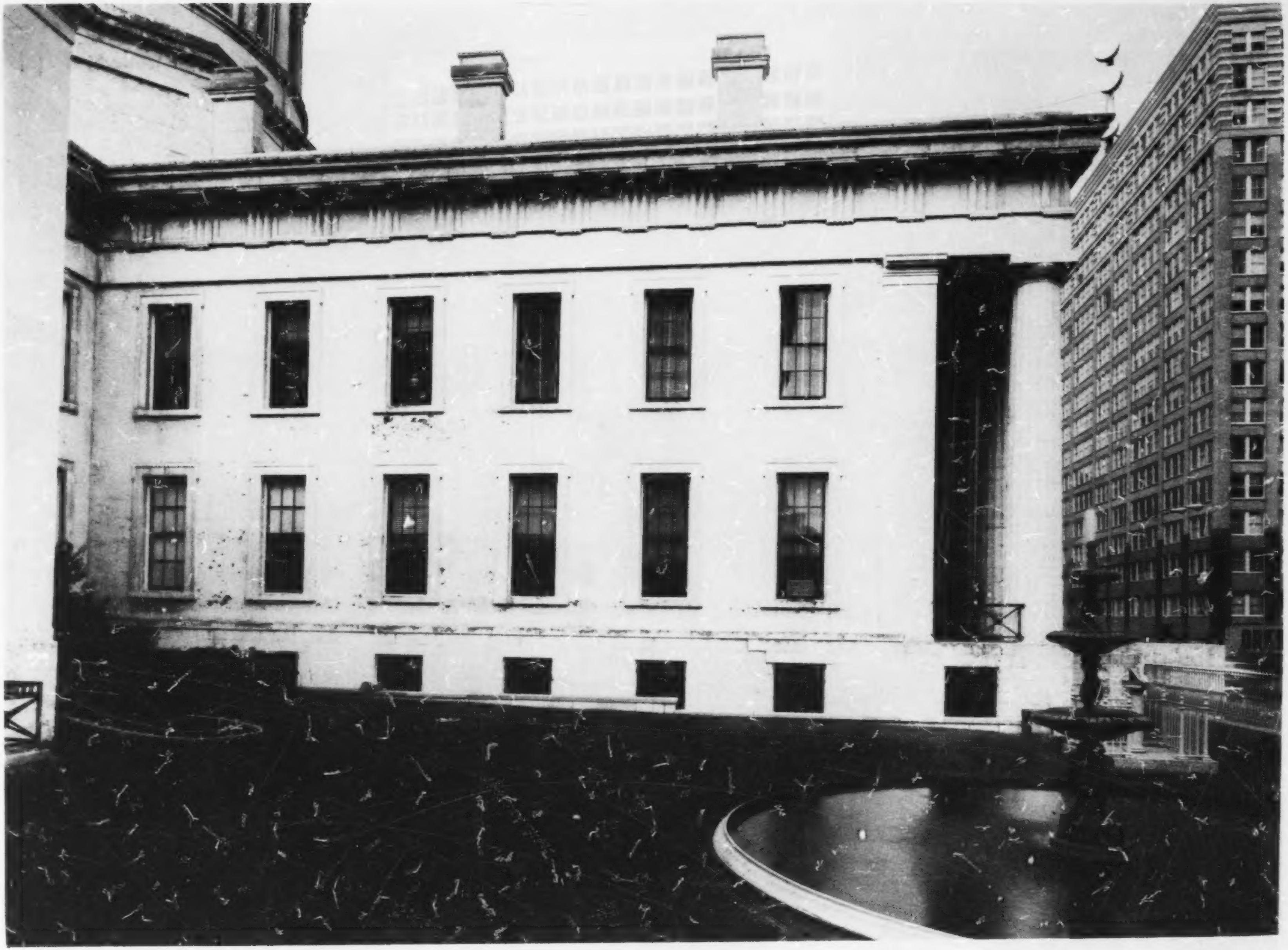
7. View looking west from the top of the Gateway Arch, 1978.



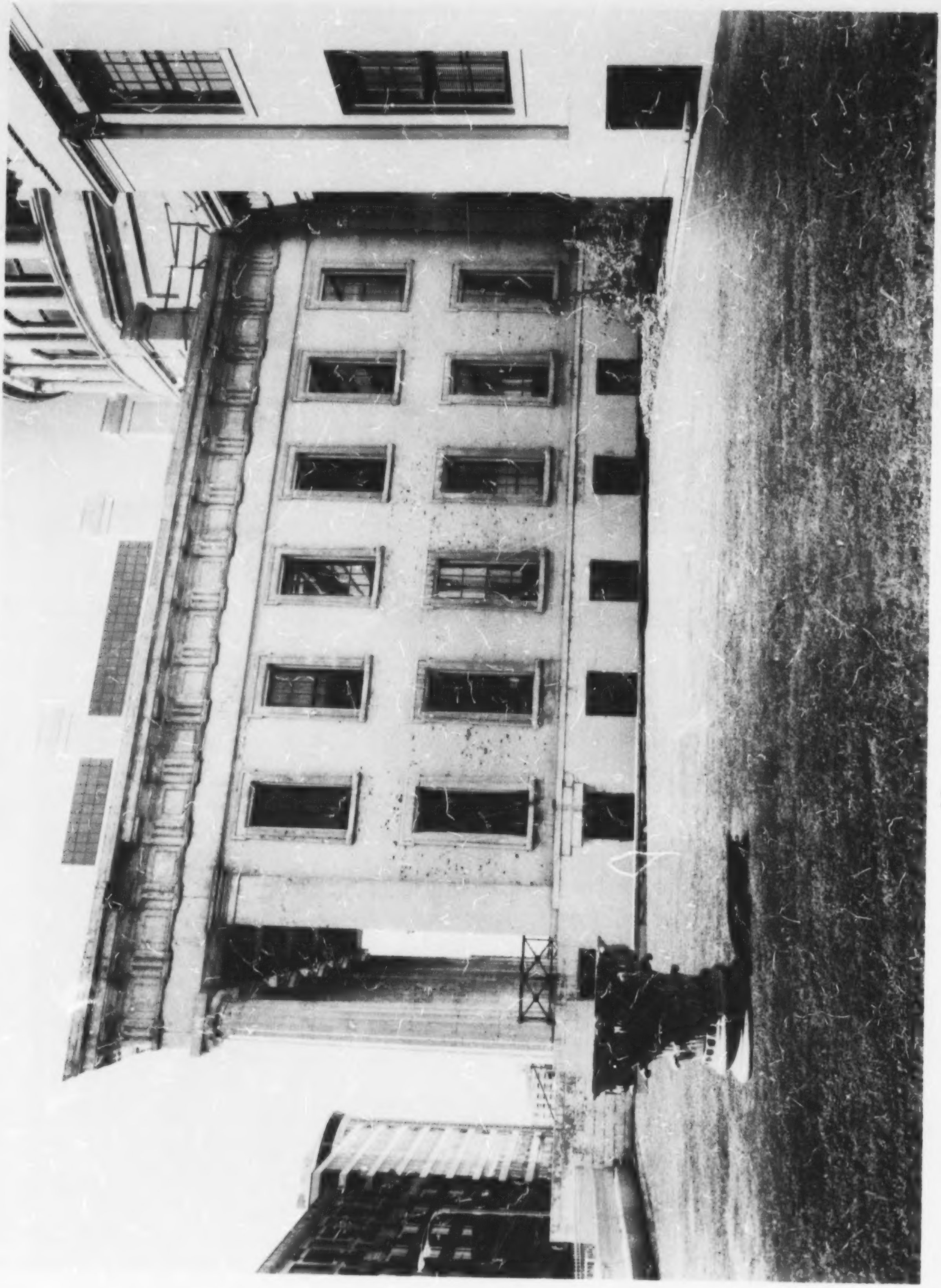
8. View of old courthouse from the southeast, 1978.



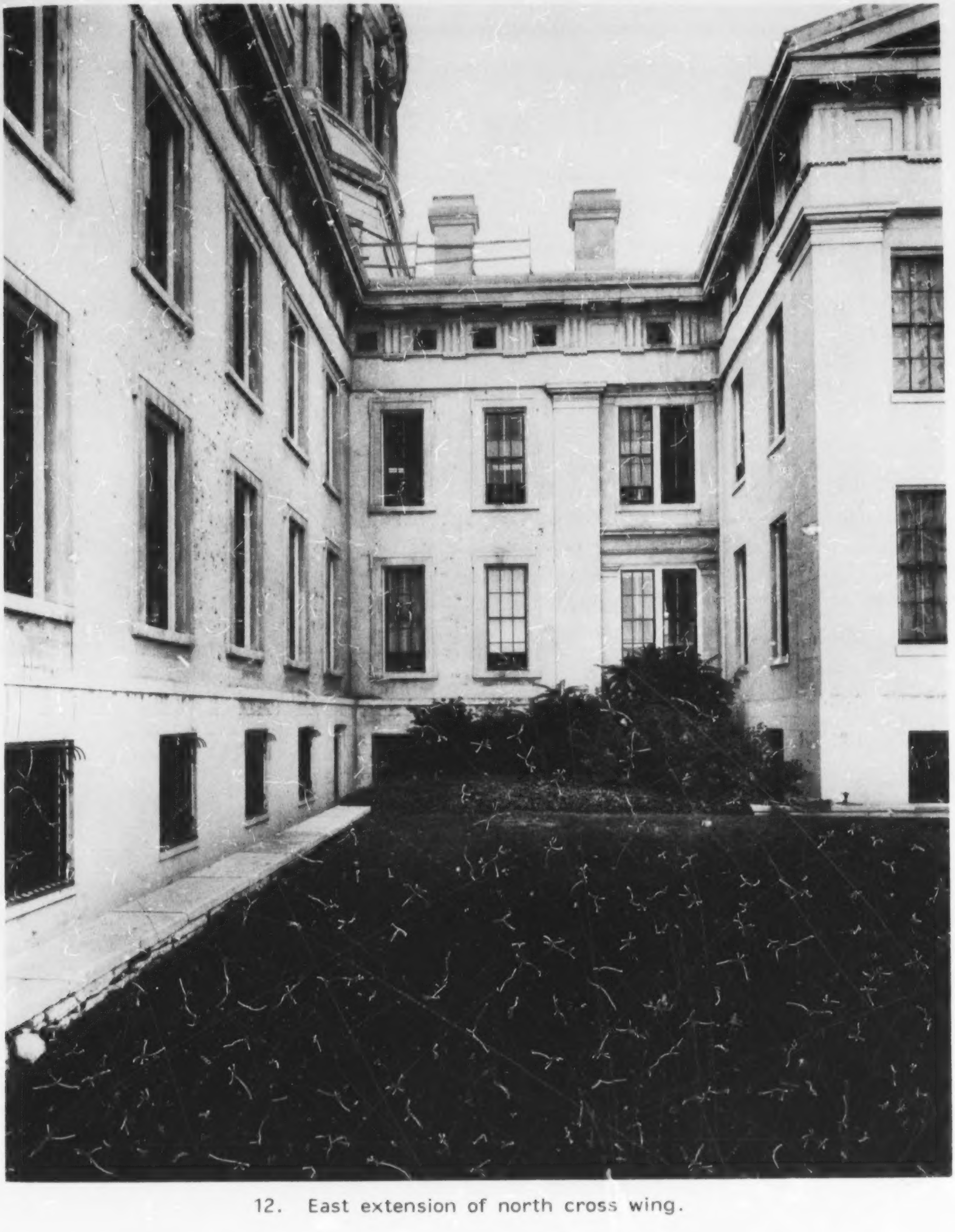
9. East elevation.



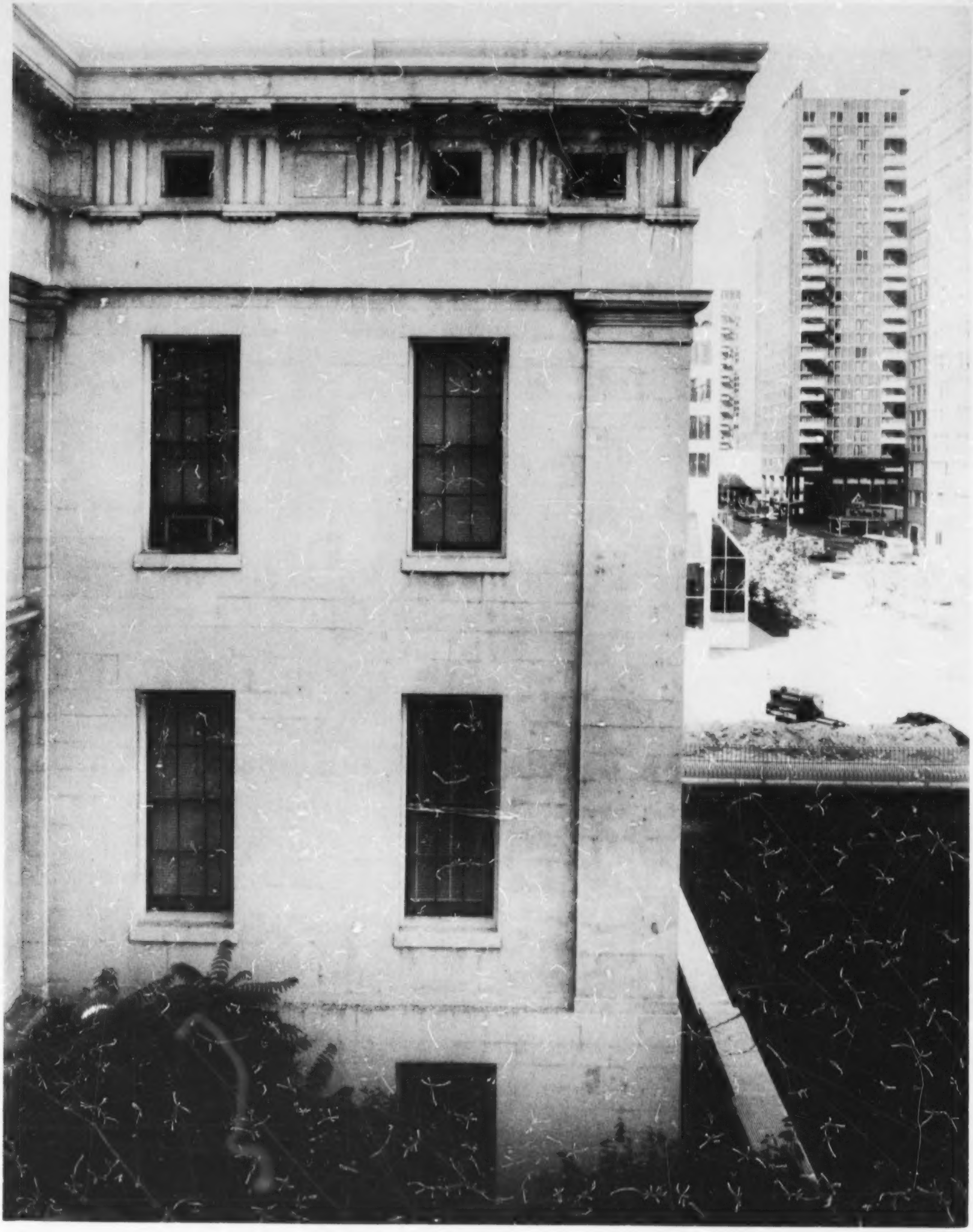
10. South side of east wing.



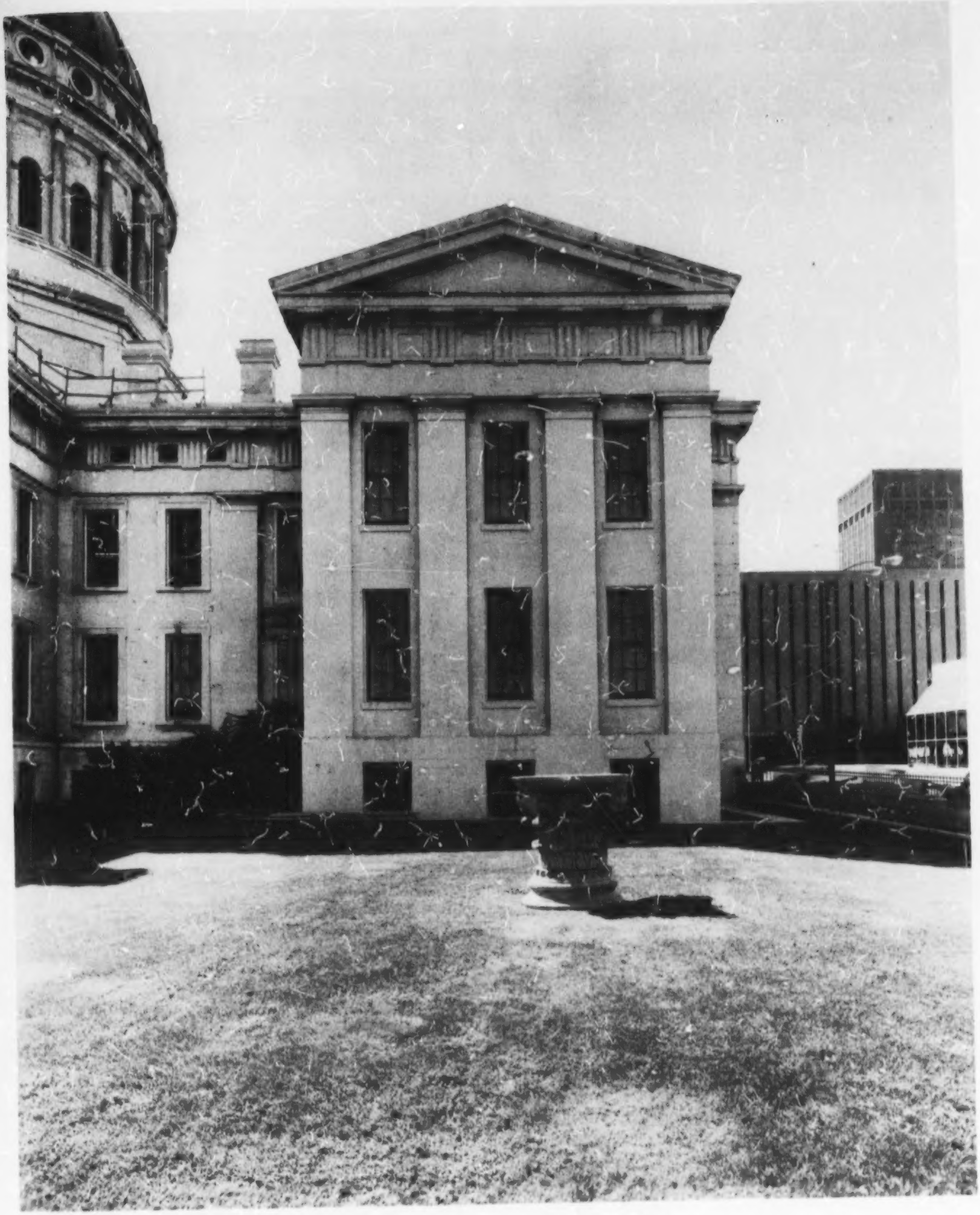
11. North side of east wing.



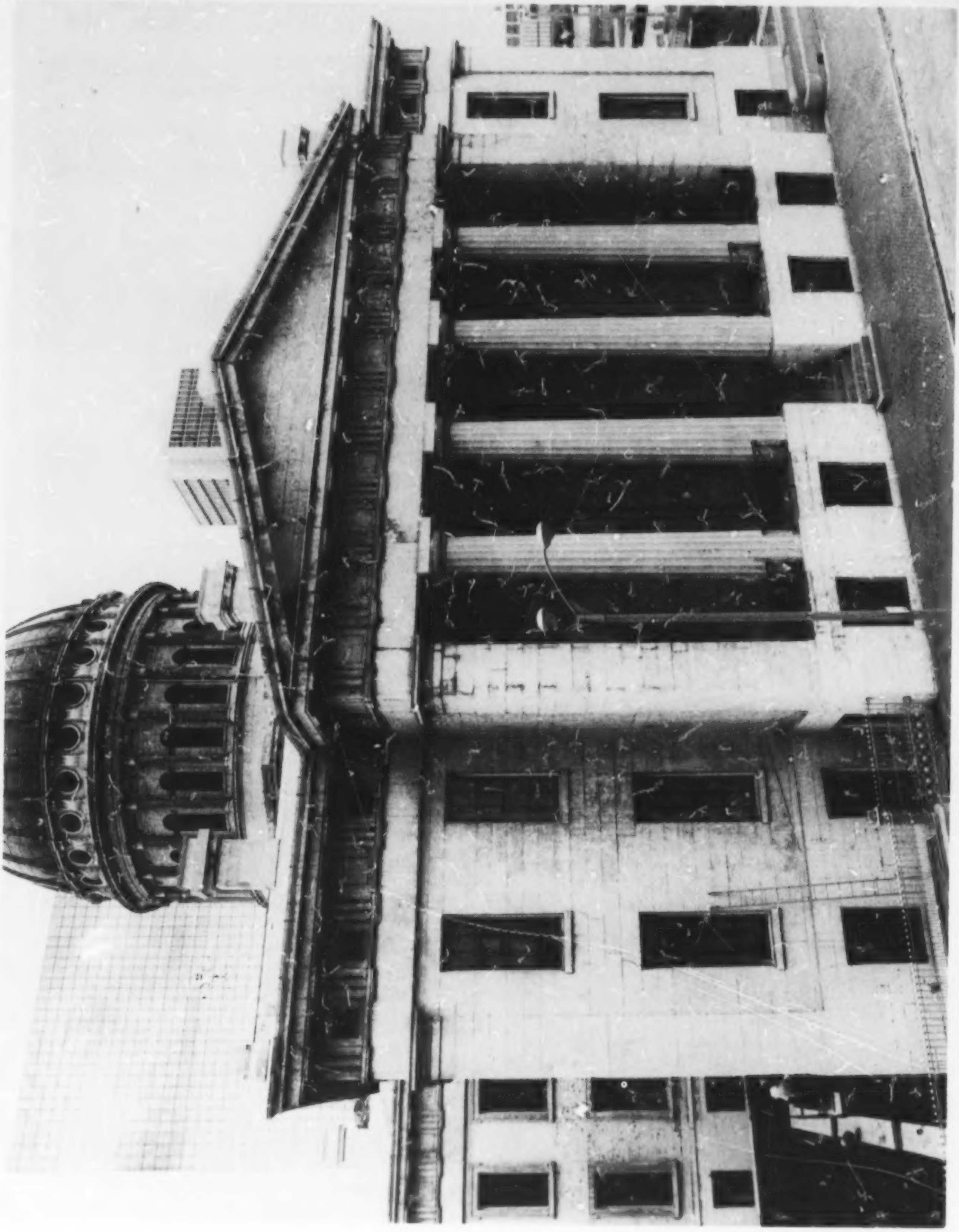
12. East extension of north cross wing.



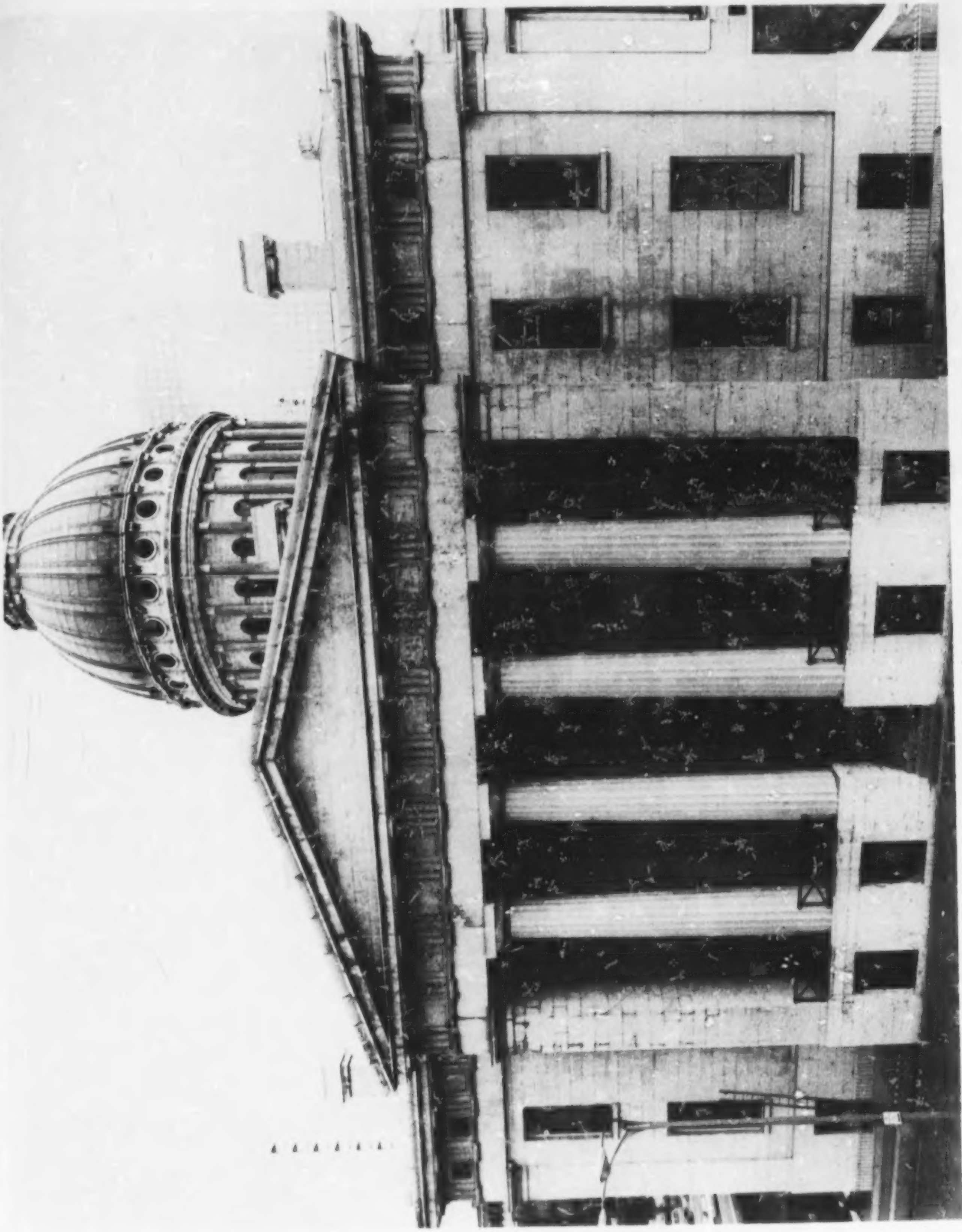
13. Southeast side of north cross wing.



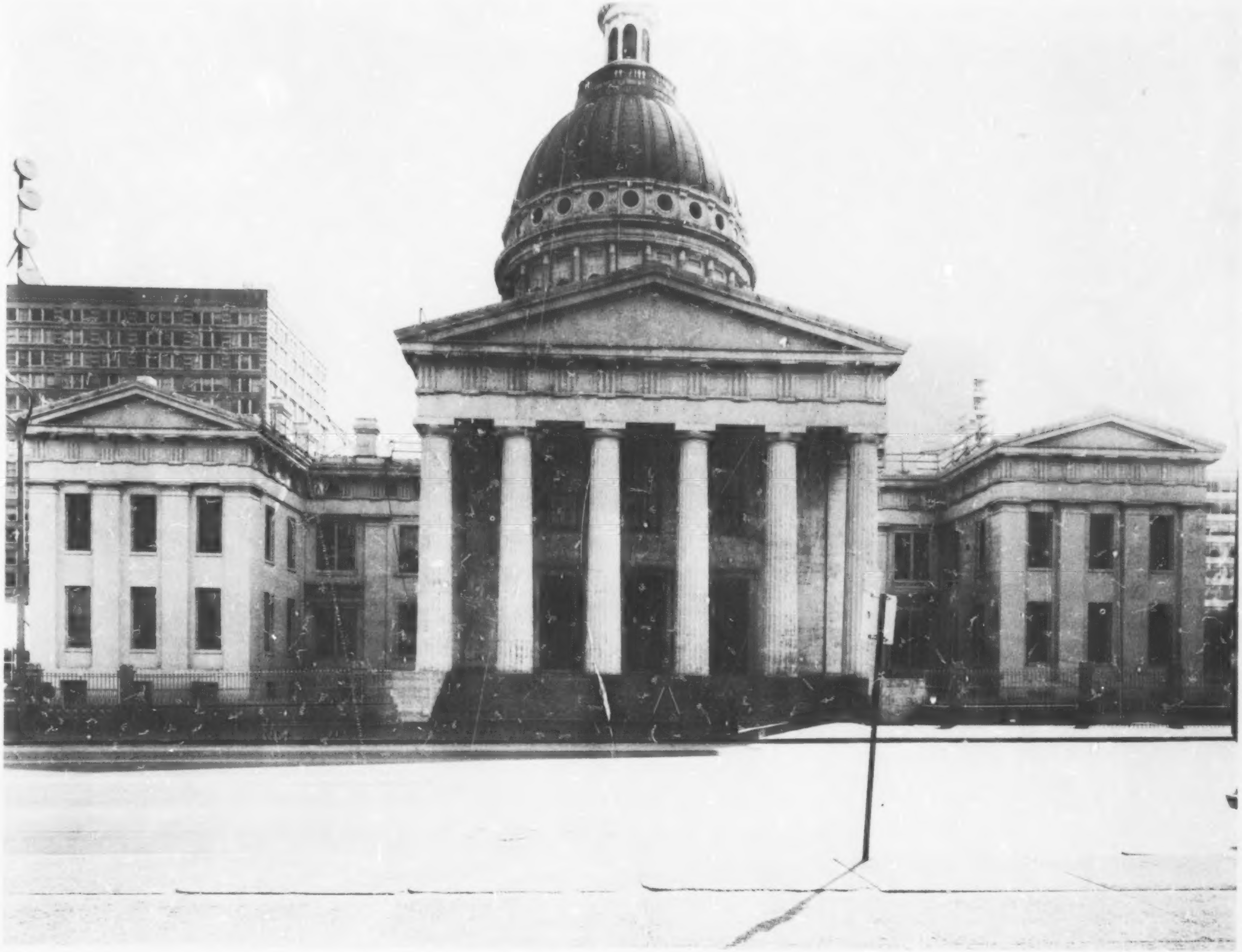
14. East end, north cross wing.



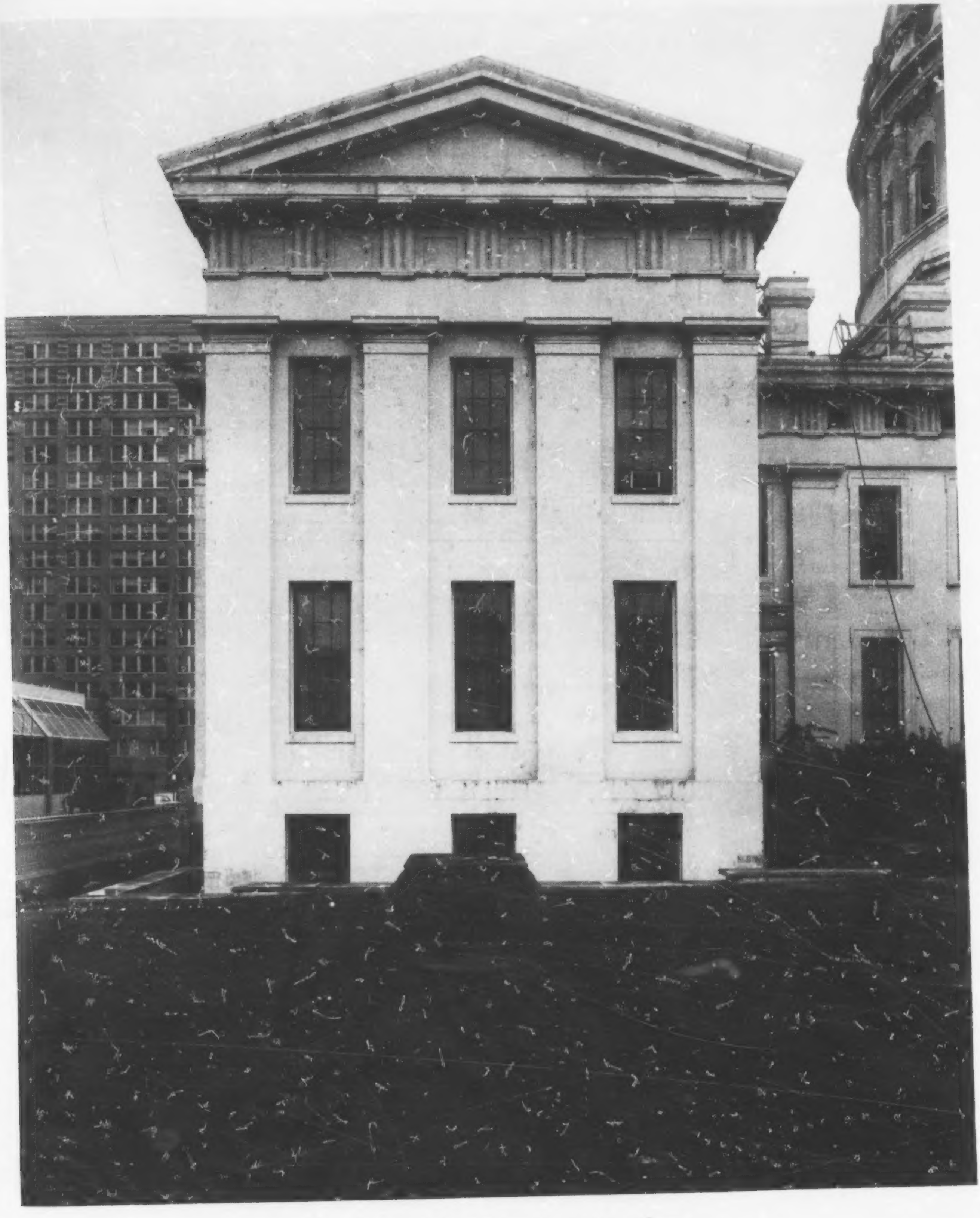
15. North portico from the northeast.



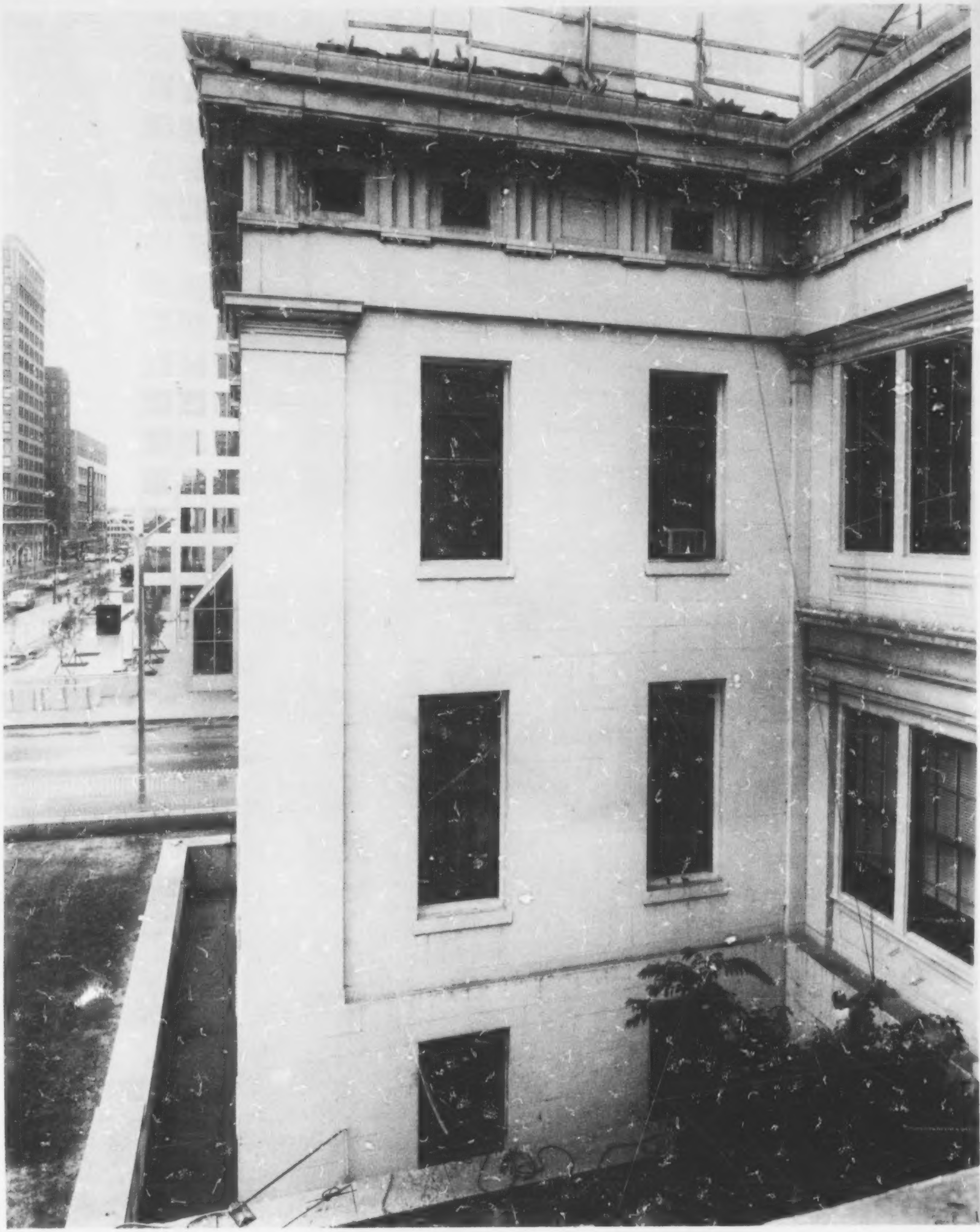
16. North portico from the northwest.



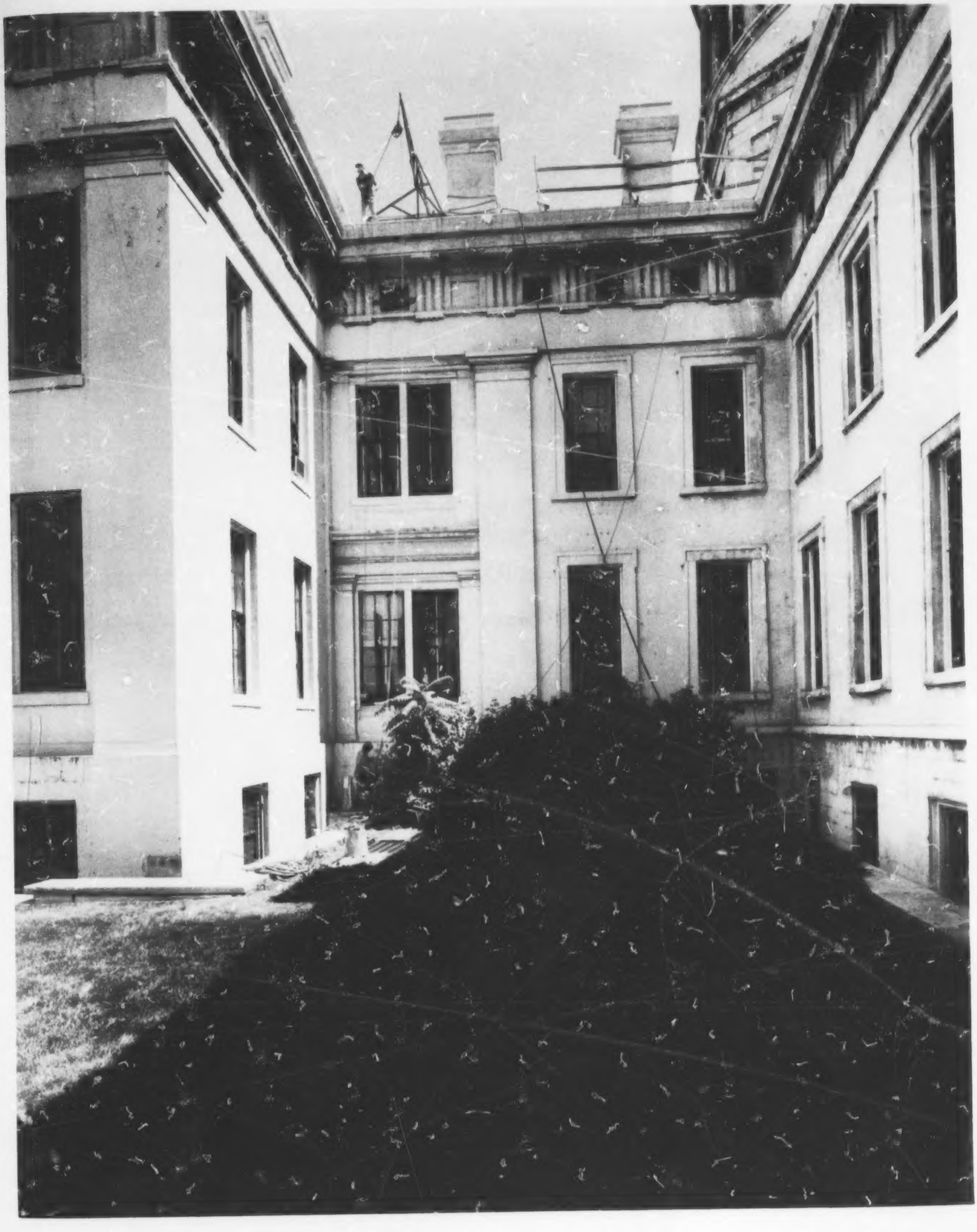
17. West elevation.



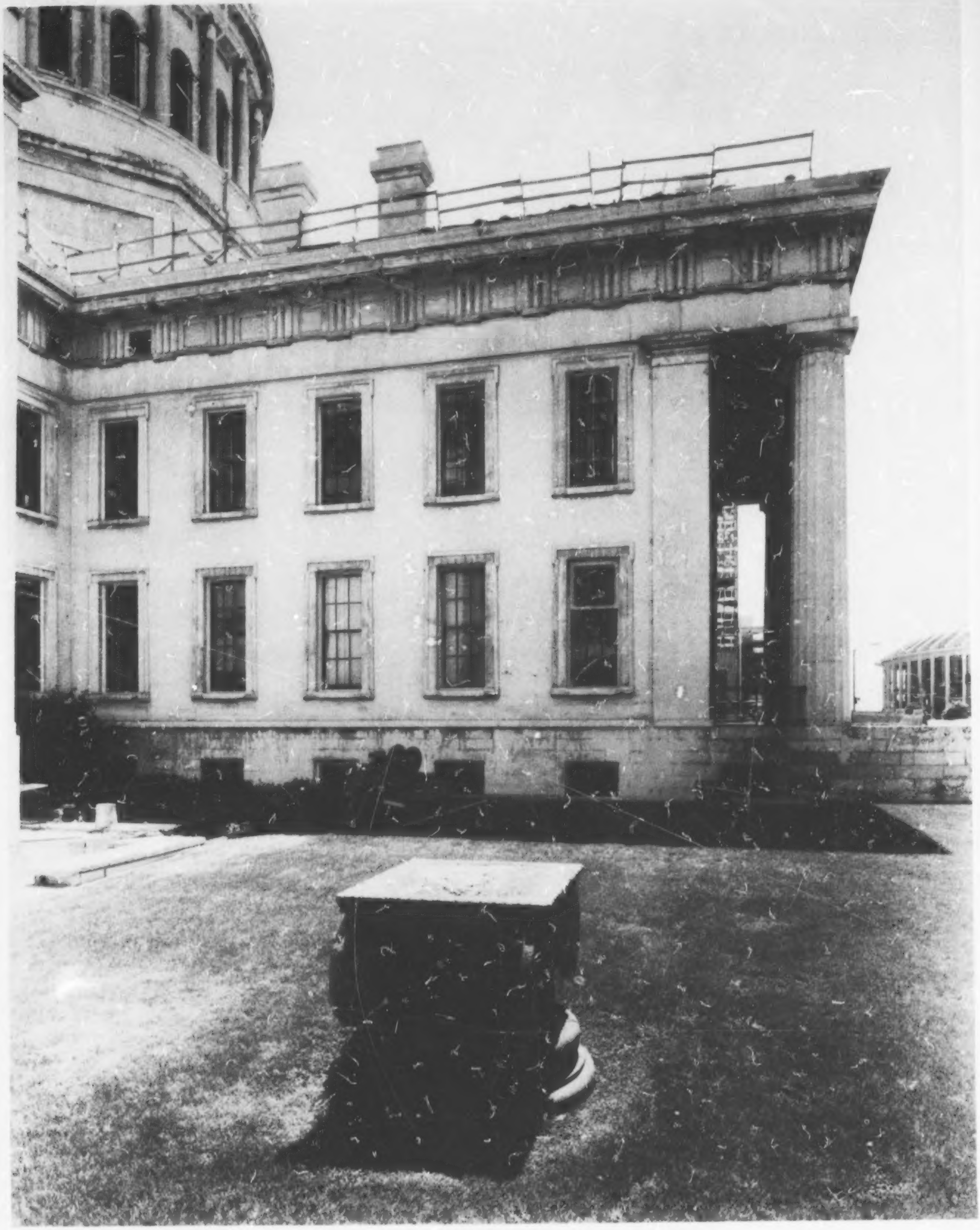
18. West side of north cross wing.



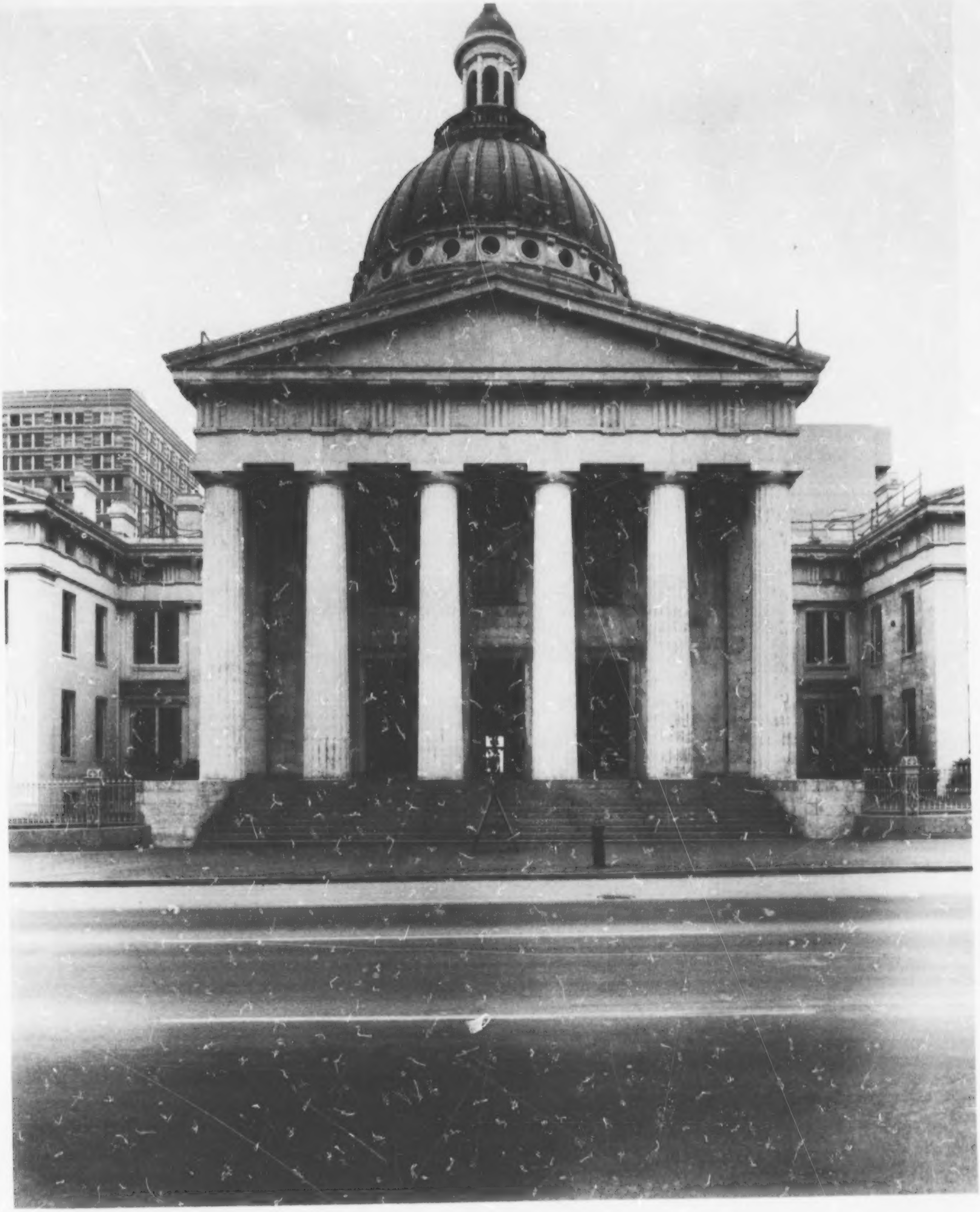
19. Southwest side of north cross wing.



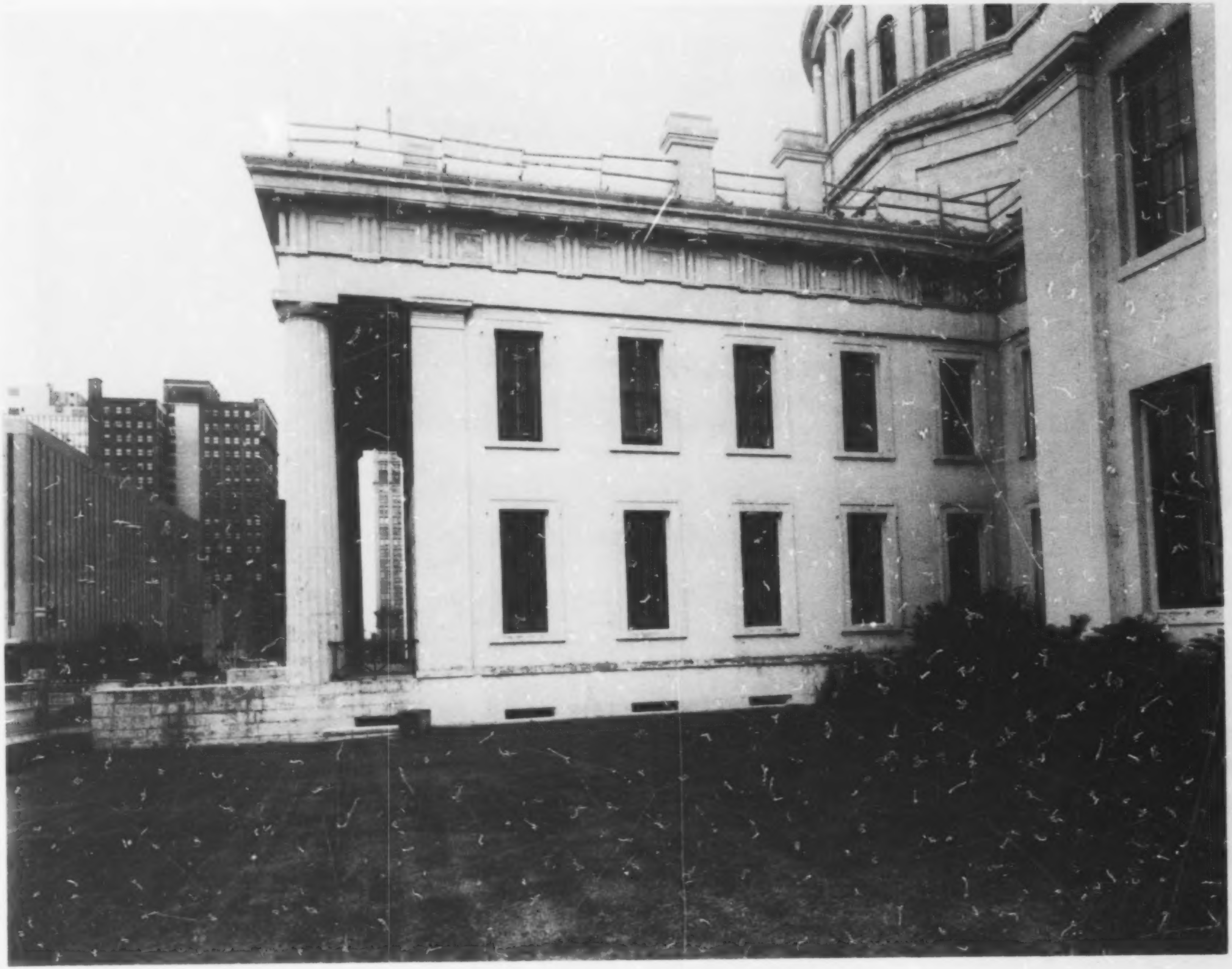
20. West side of north extension.



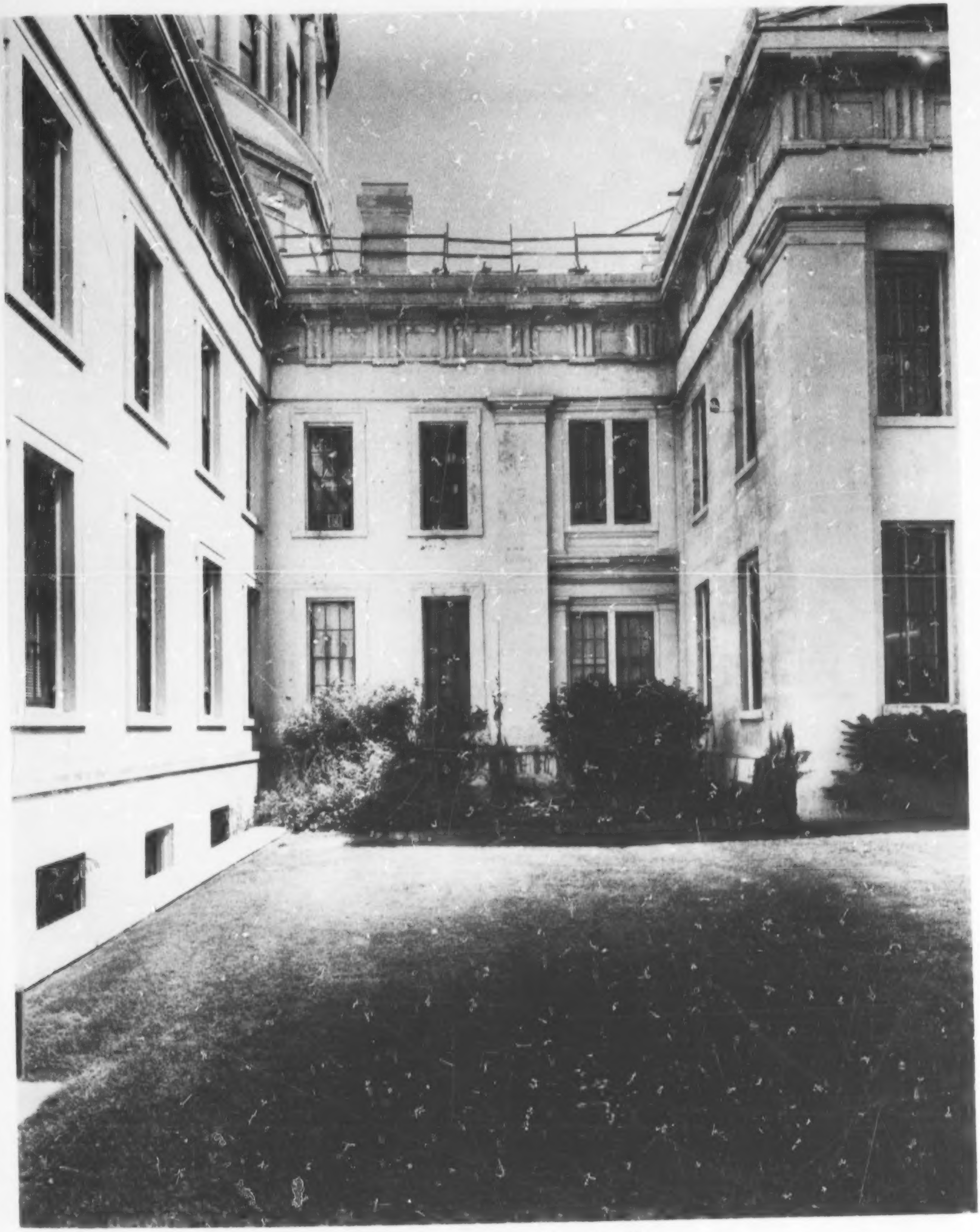
21. North side of west wing.



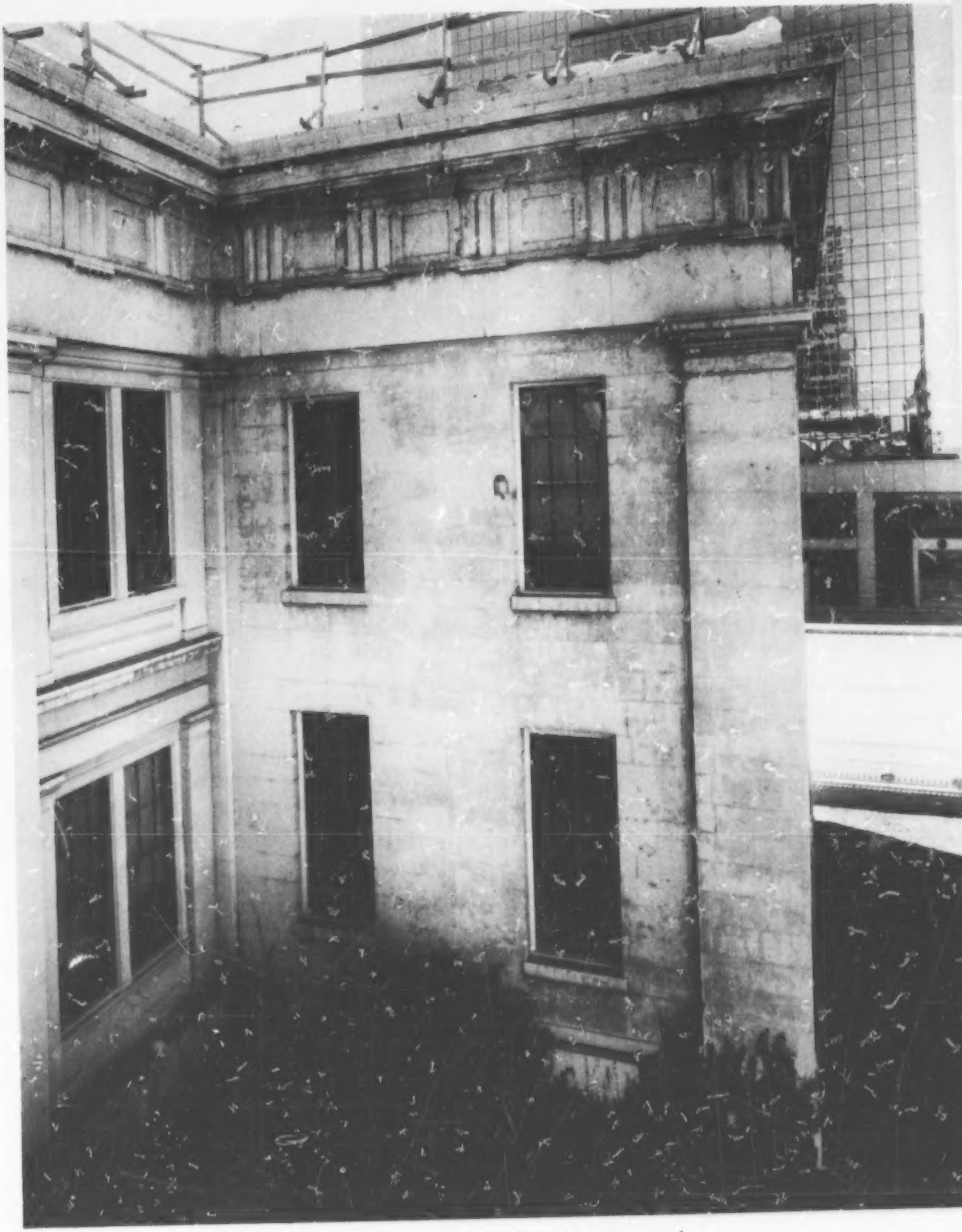
22. West portico.



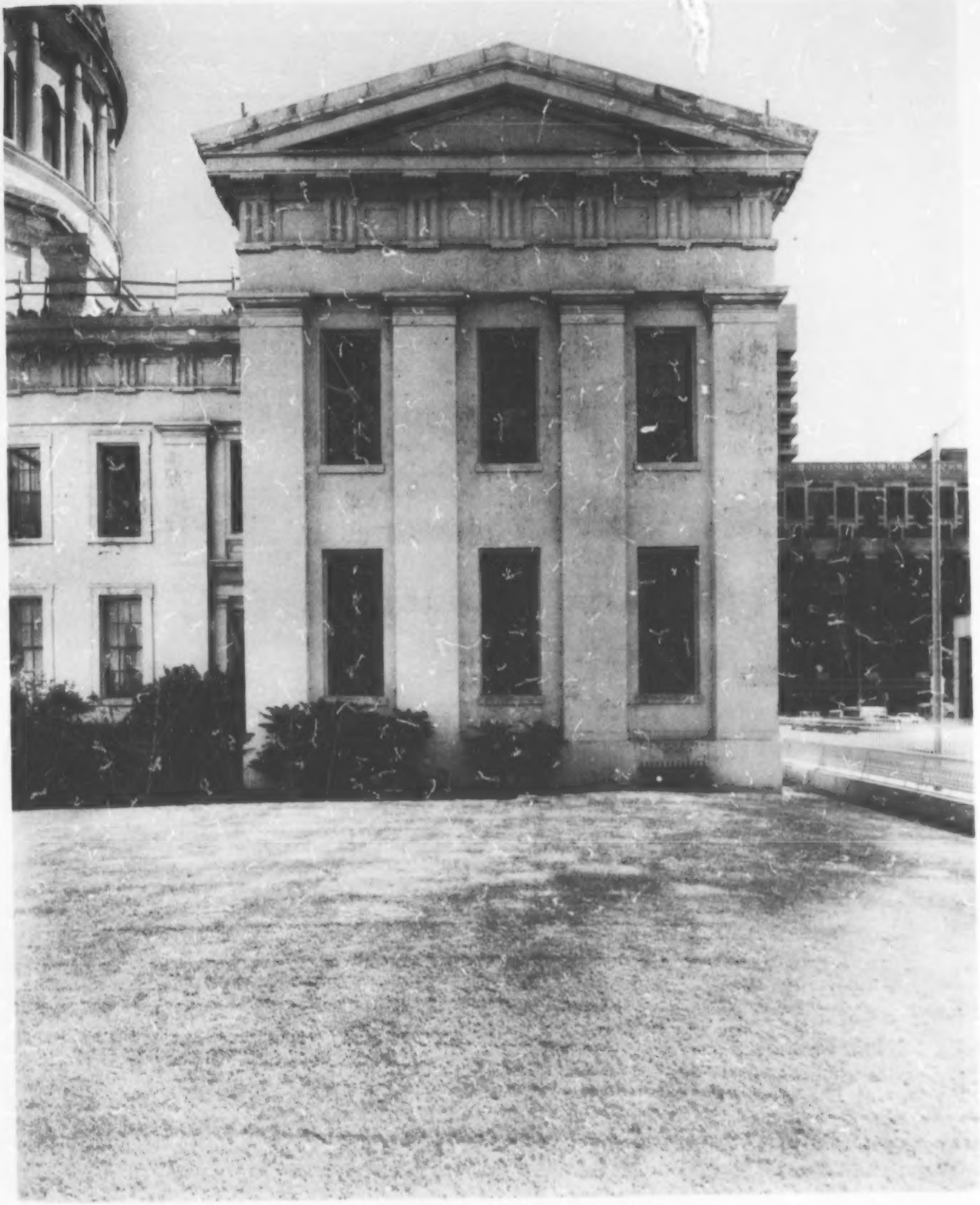
23. South side of west wing.



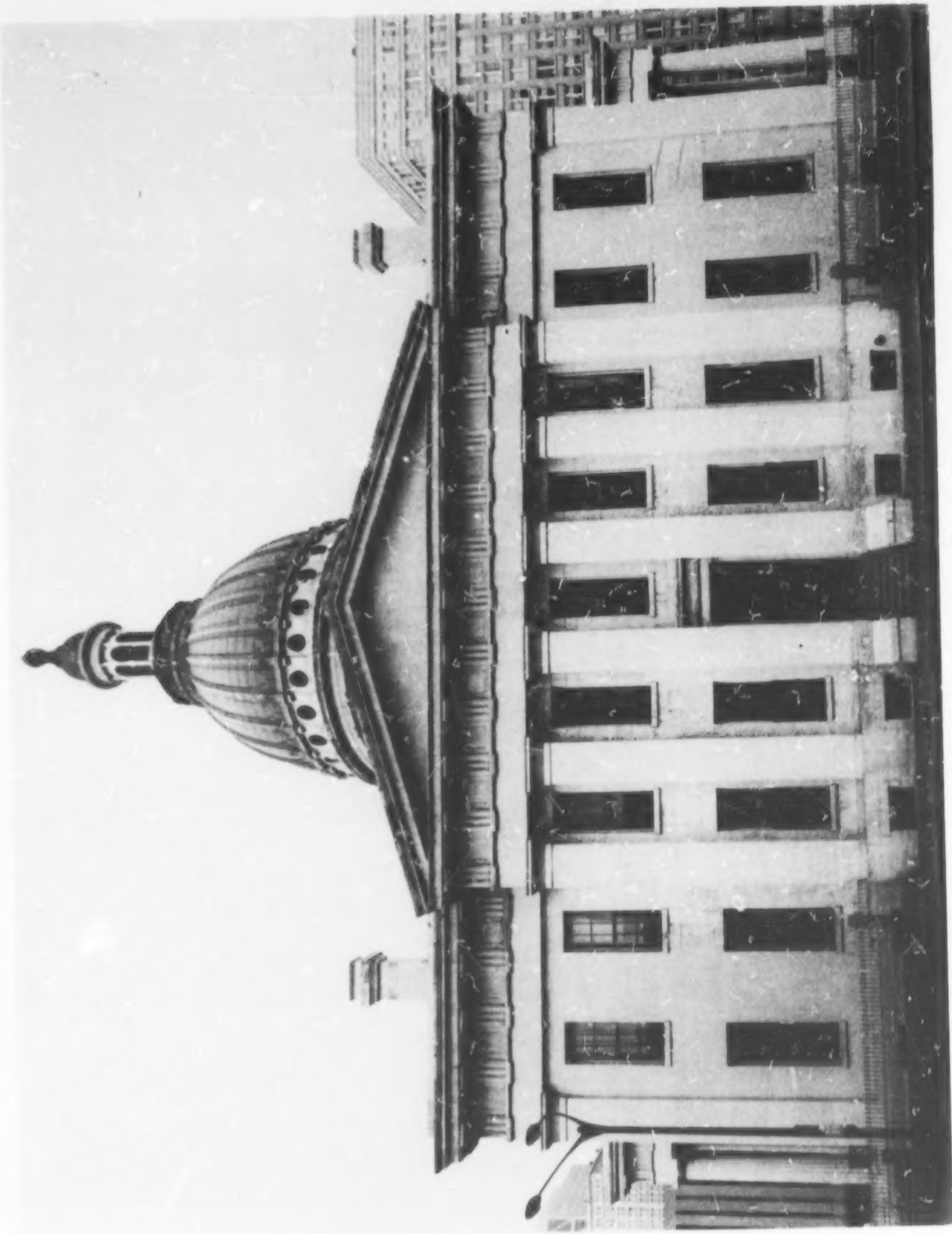
24. West side of south extension.



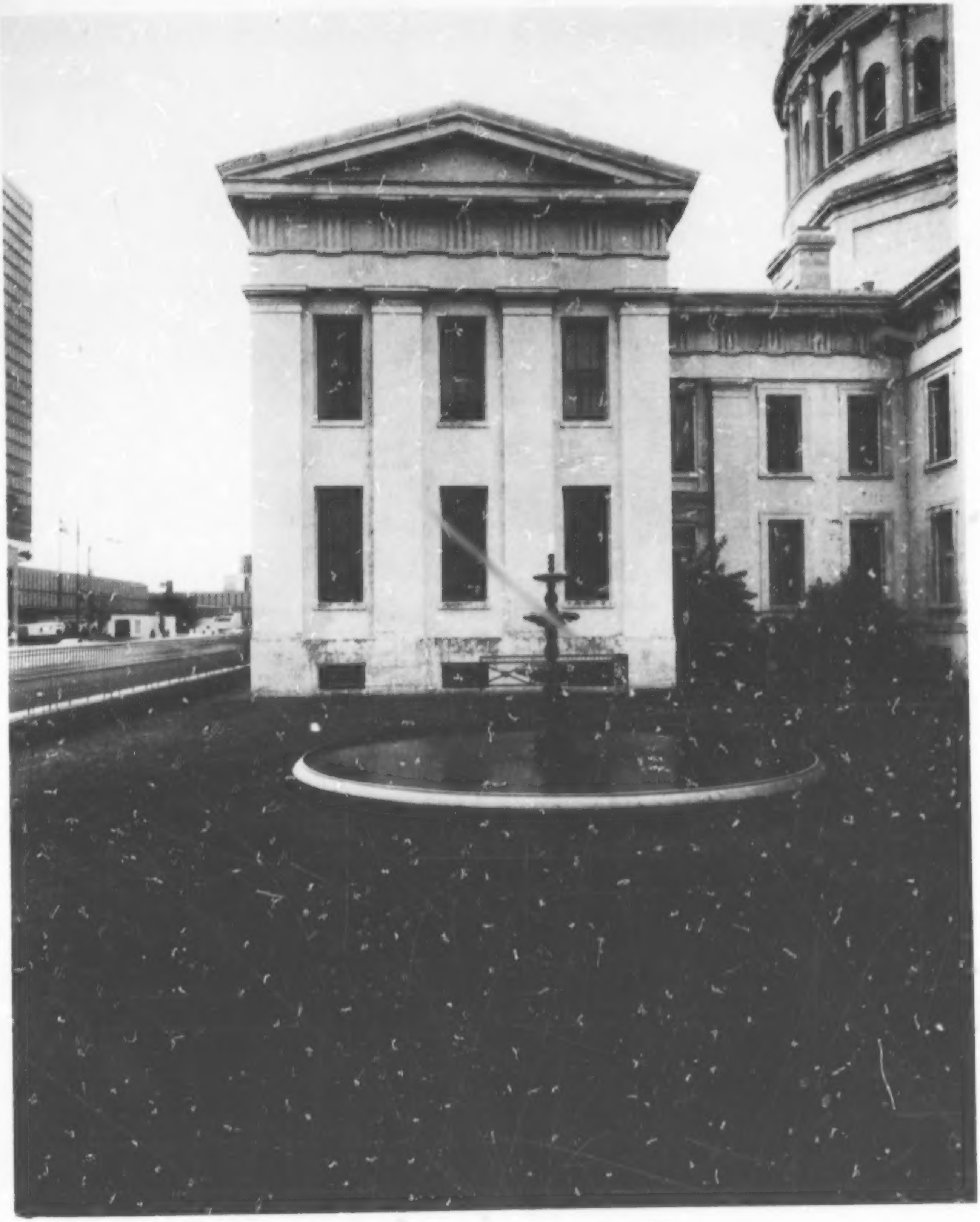
25. Northwest side of south cross wing.



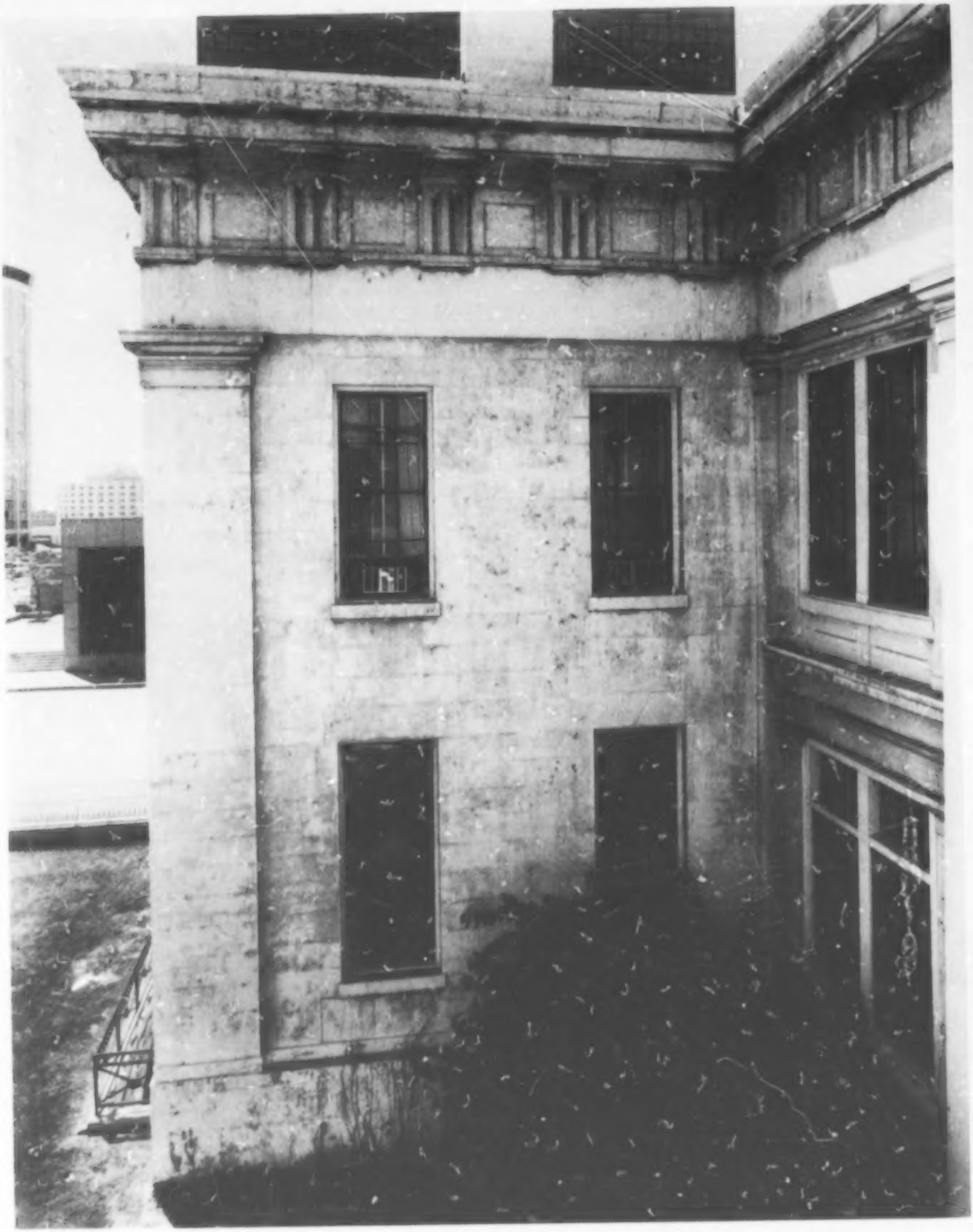
26. West side of south cross wing.



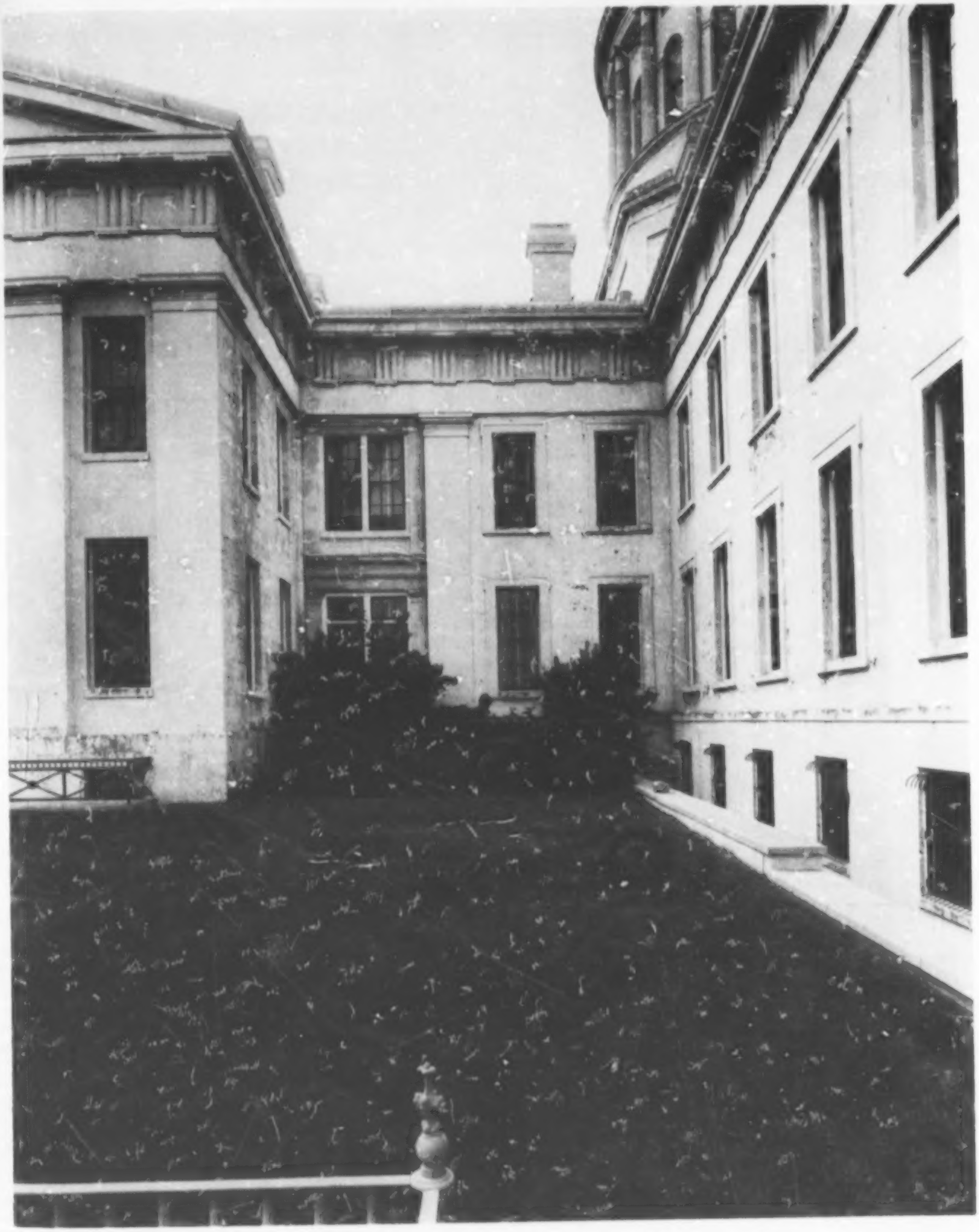
27. South elevation.



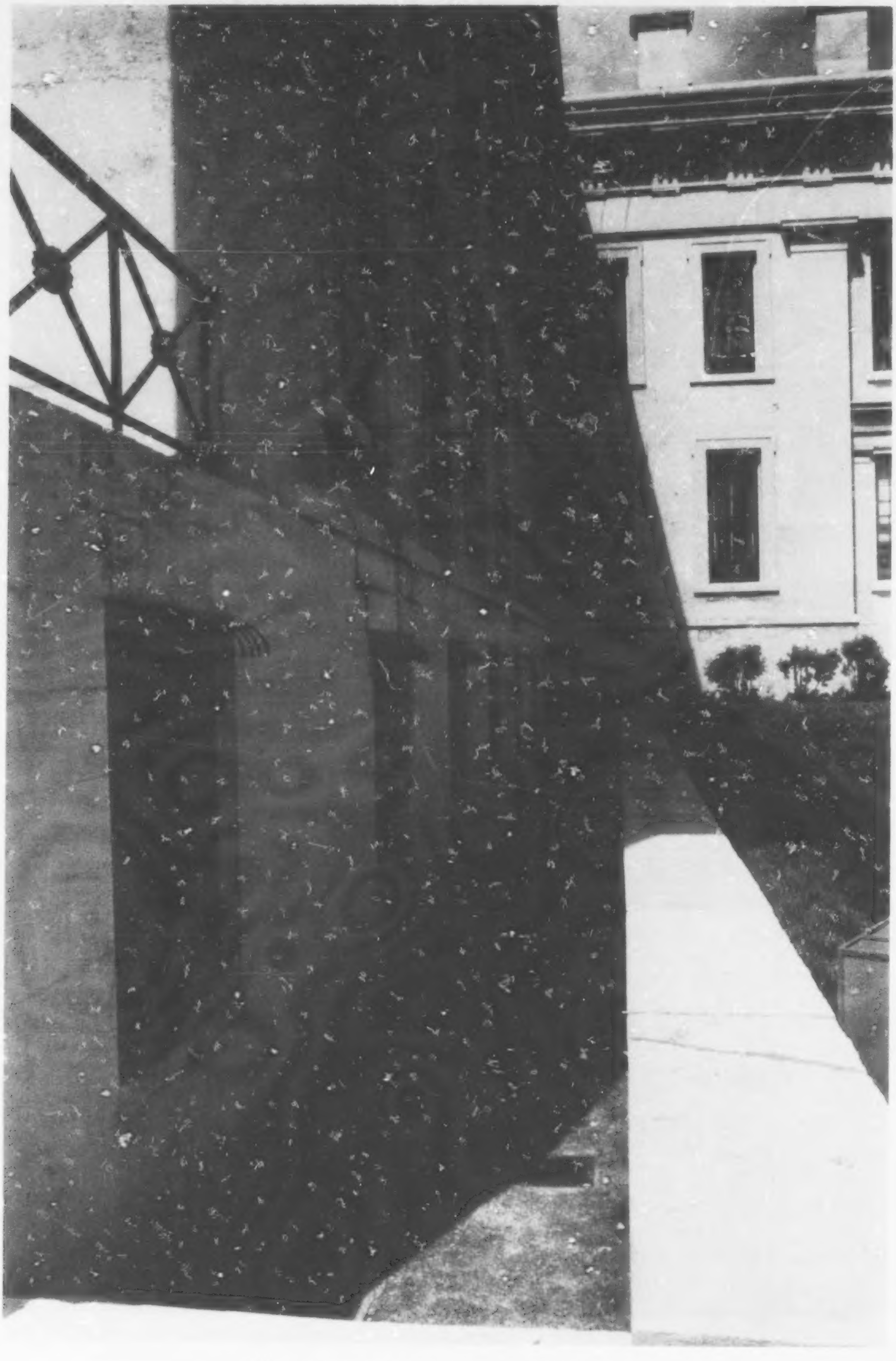
28. East side of south cross wing.



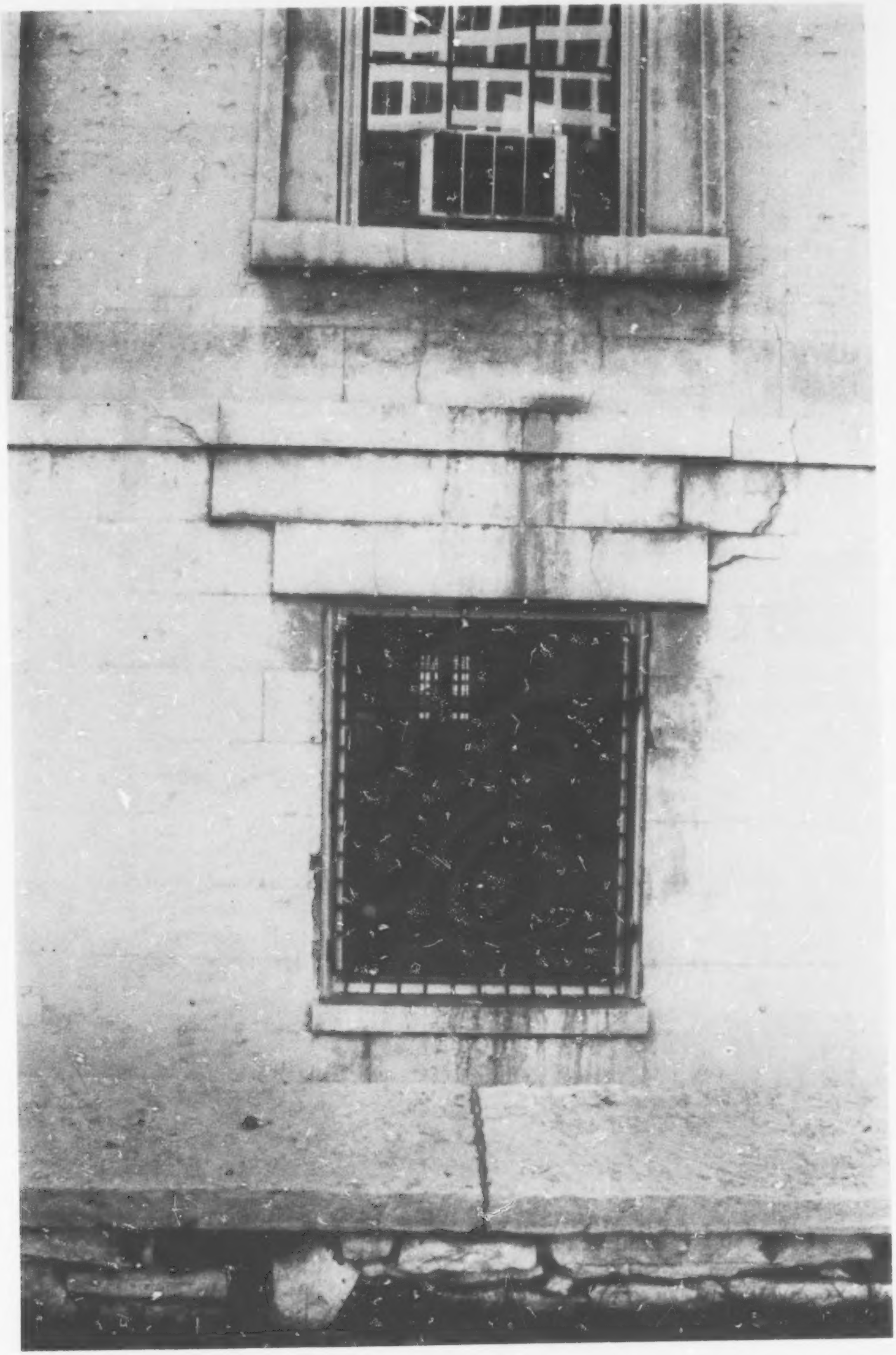
29. Northeast side of south cross wing.



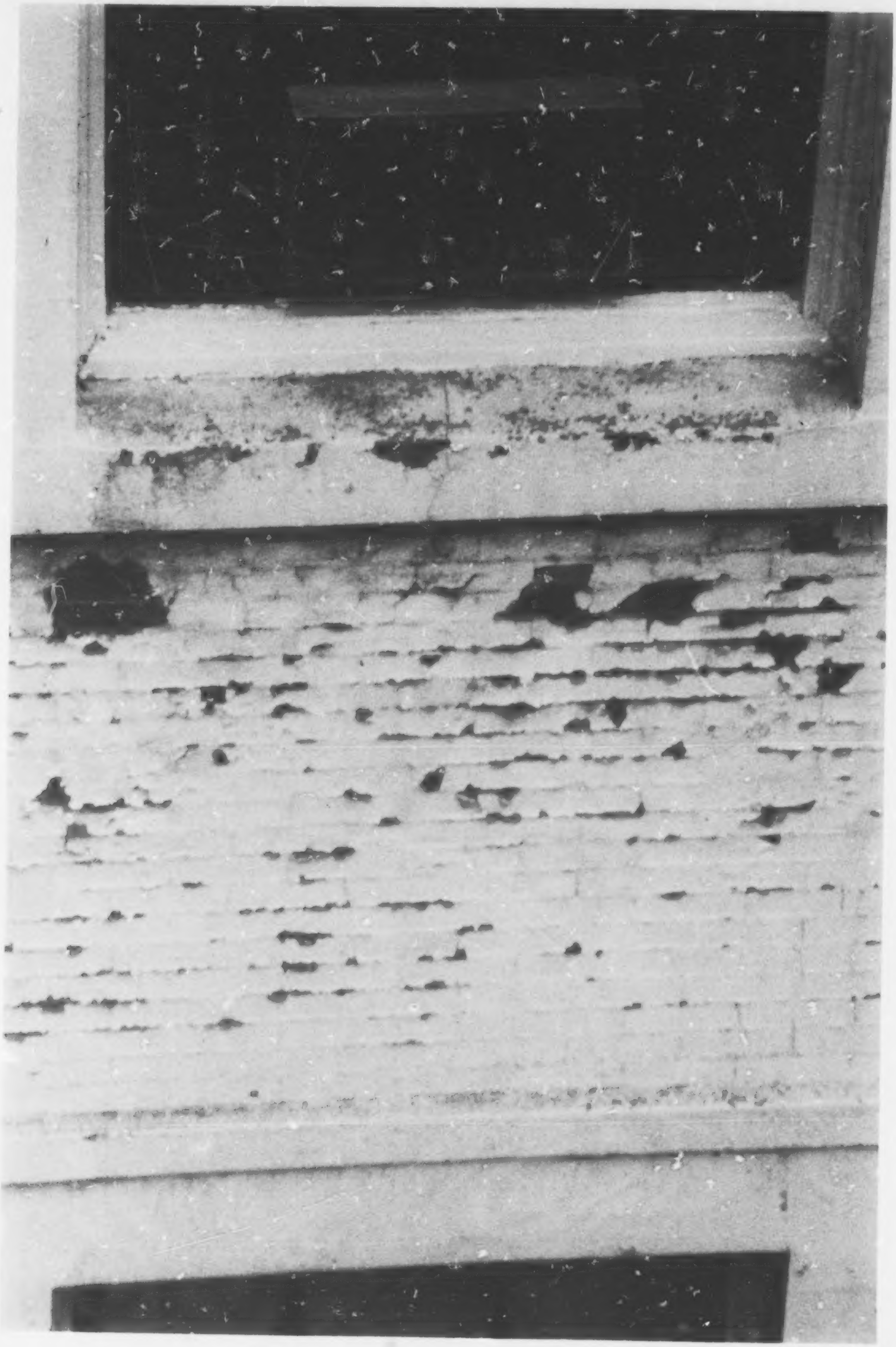
30. East side of south extension.



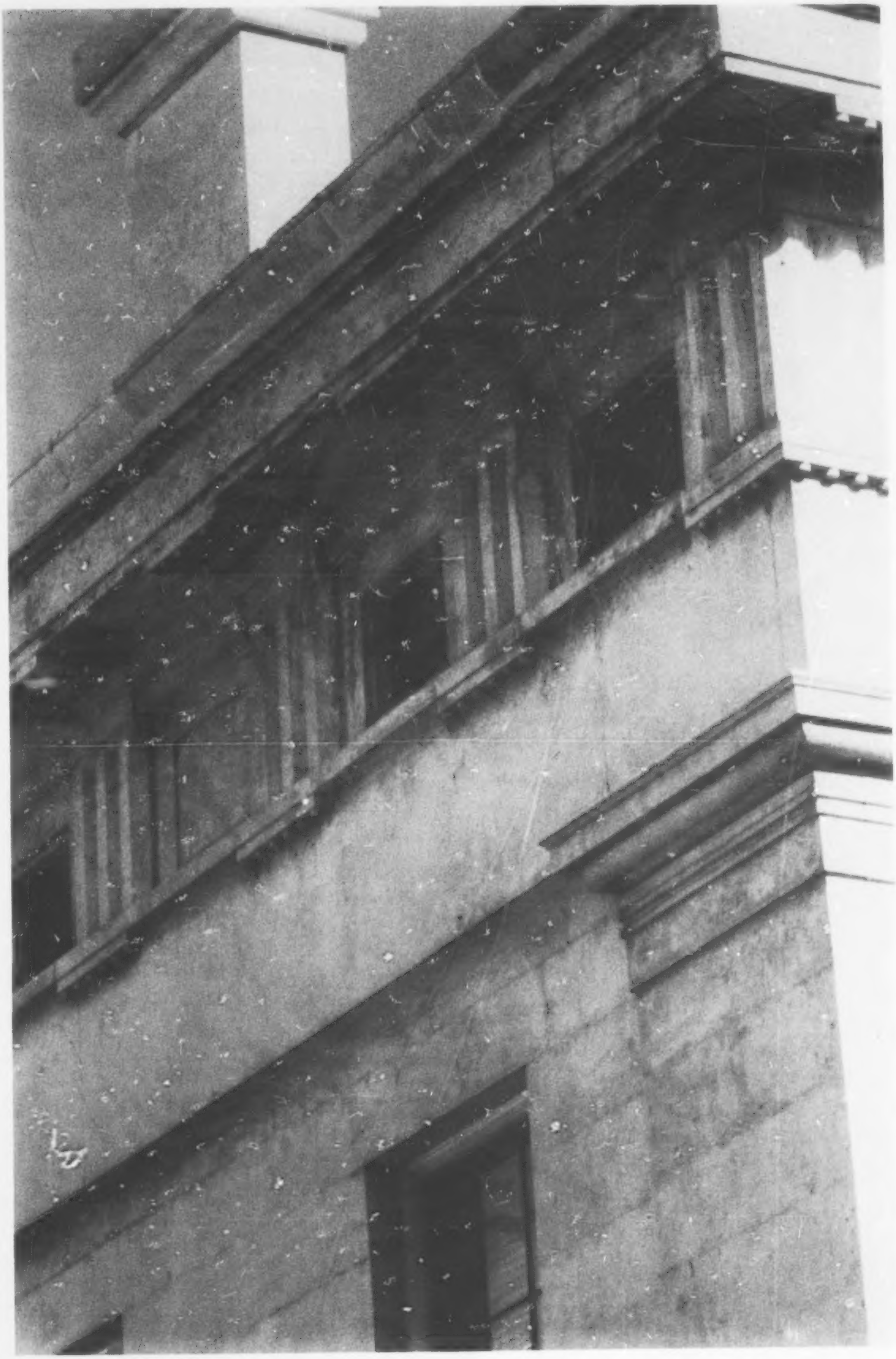
31. North areaway, east wing.



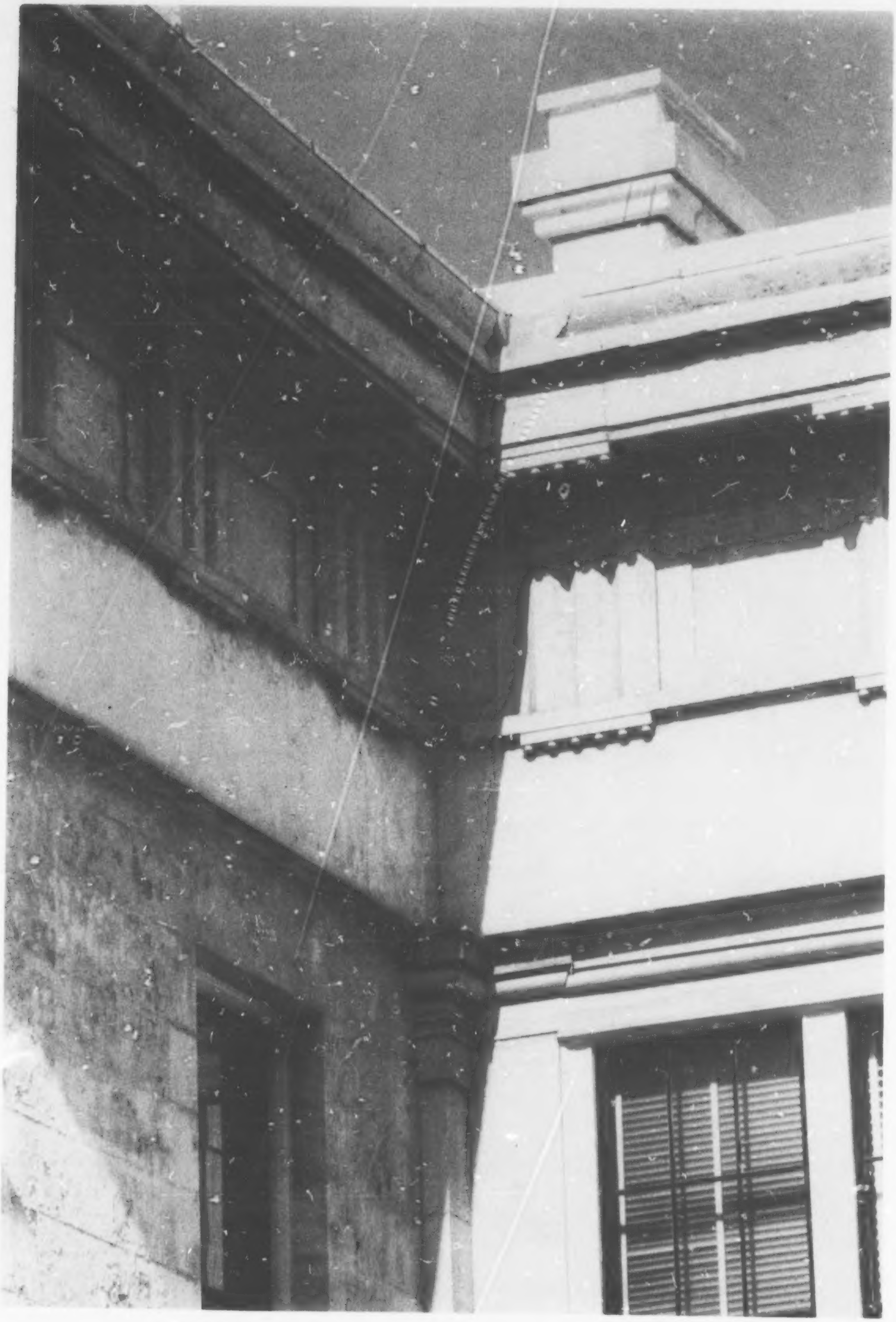
32. Displaced stones at basement window, north side of east wing (south side similar).



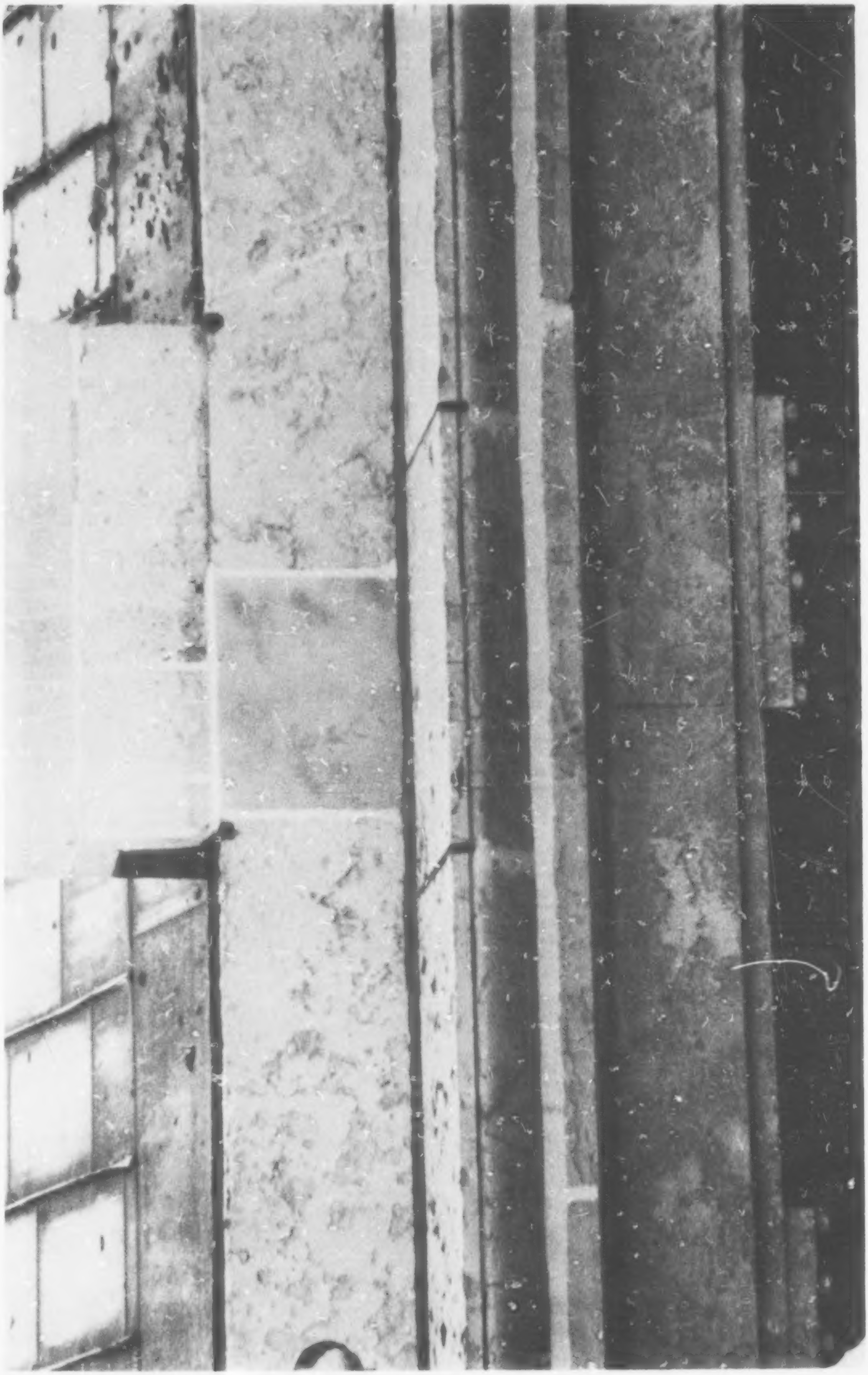
33. Paint deterioration on brick.



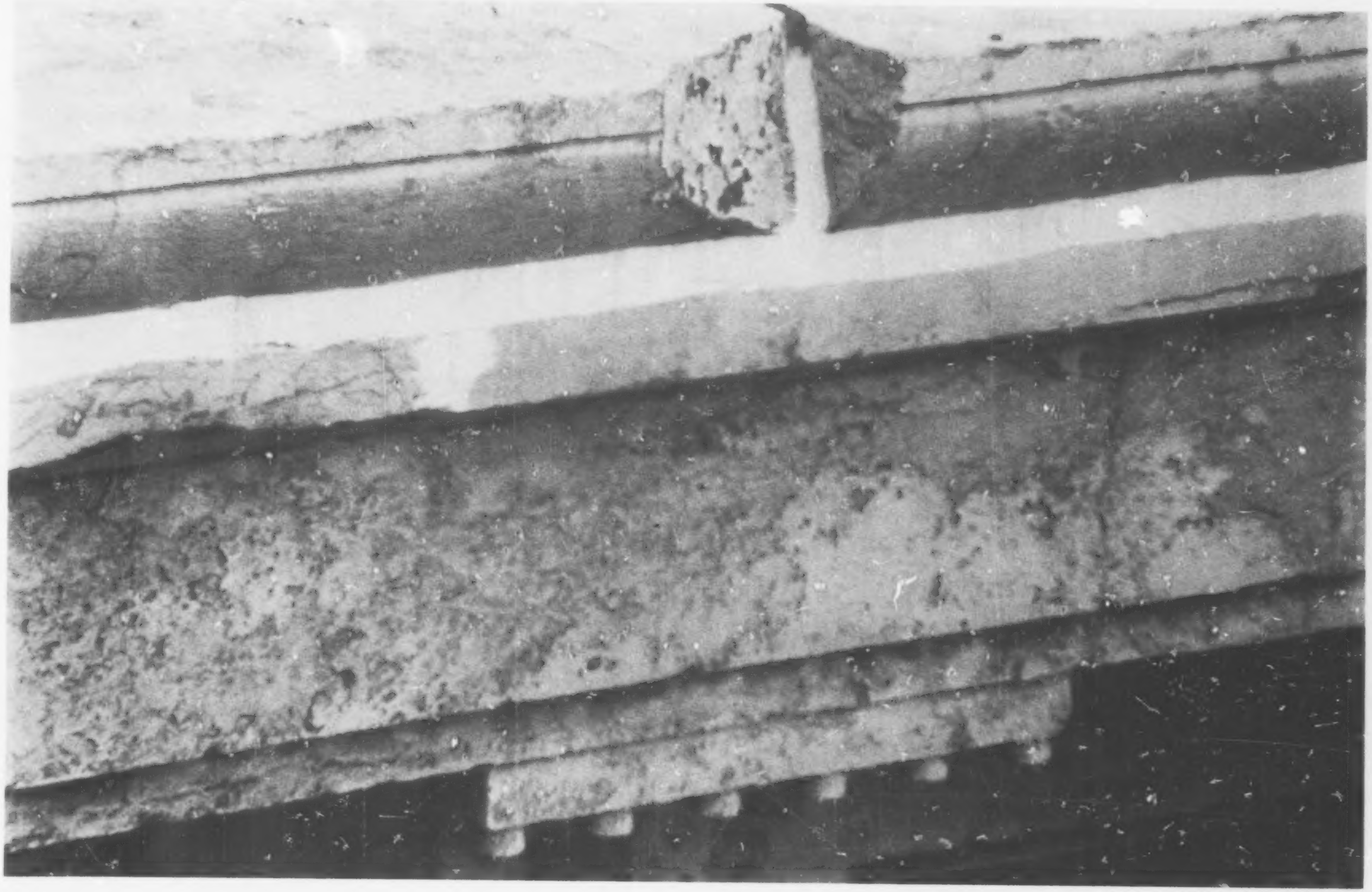
34. Typical outside corner of cornice.



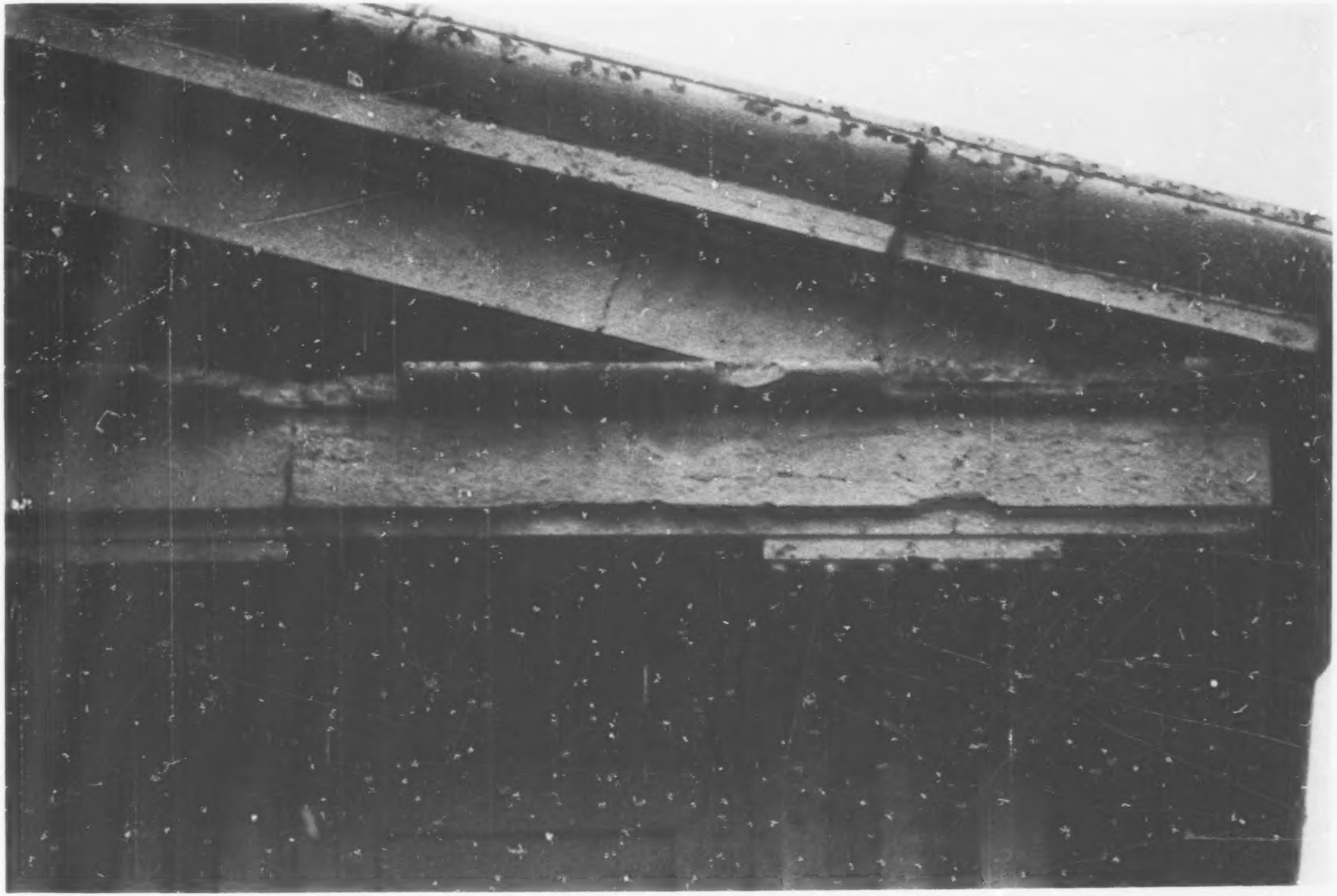
35. Typical inside corner of cornice.



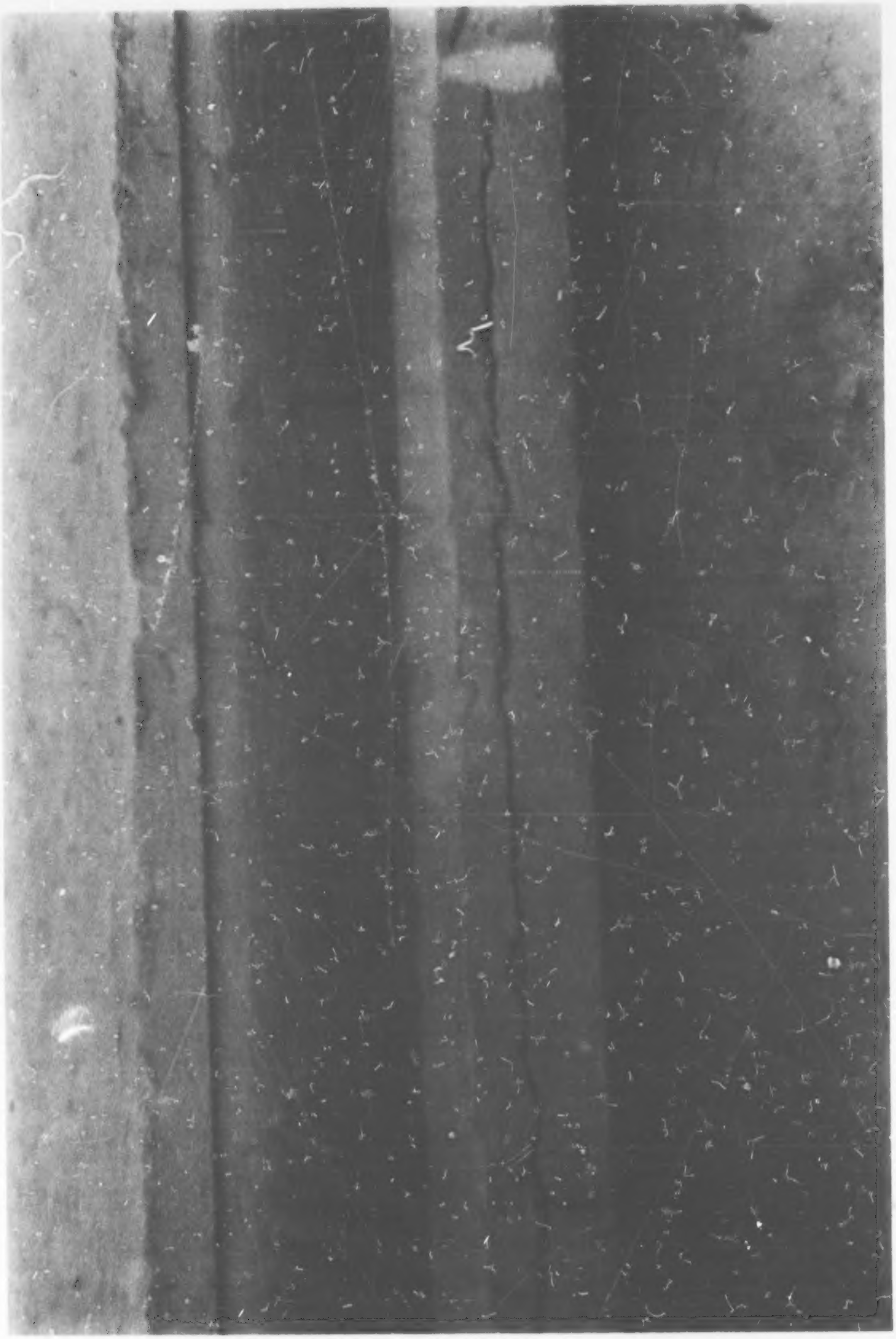
36. Cornice section in relatively good condition. Note replacement stone in parapet.



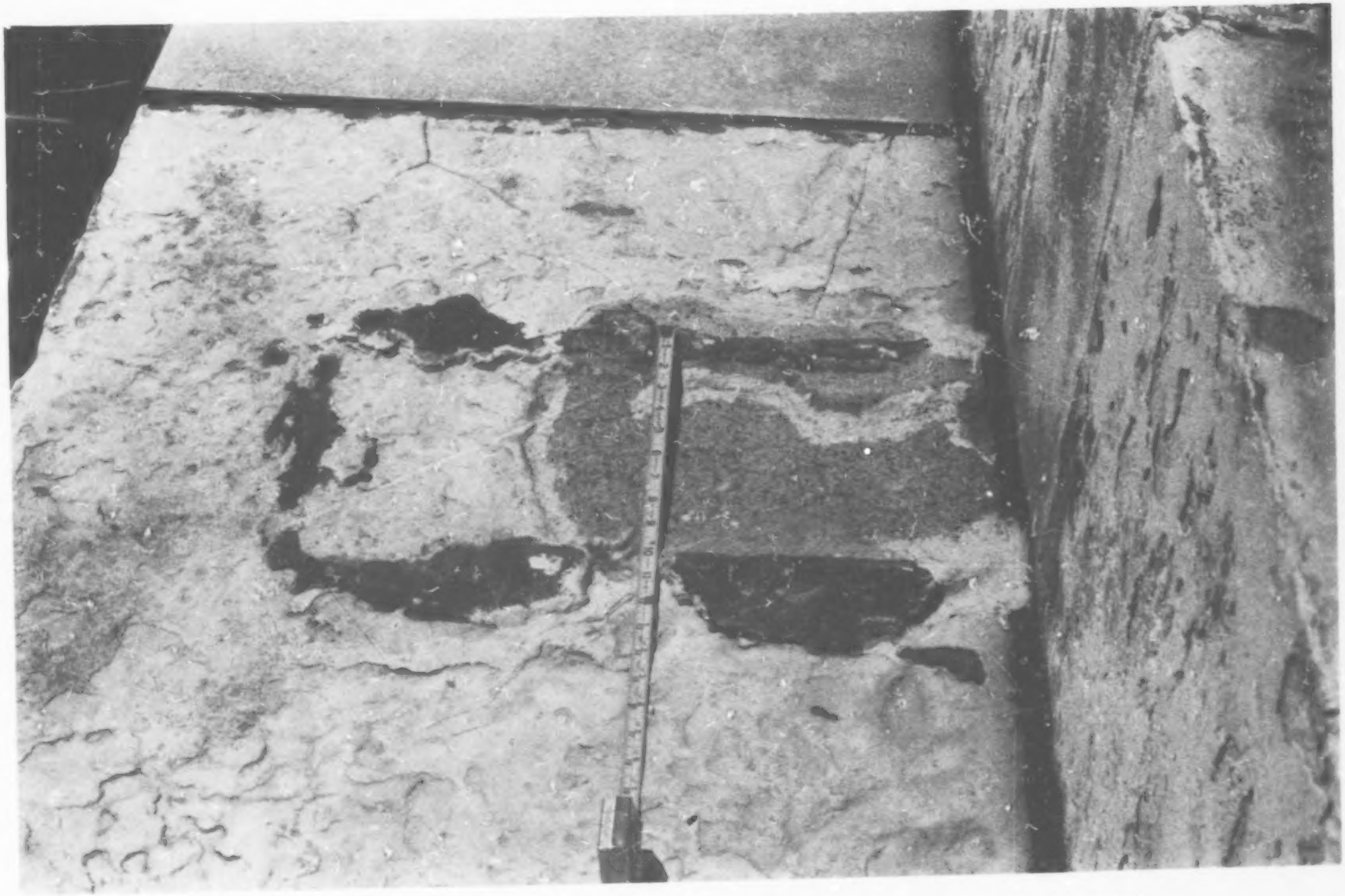
37. Typical chipped section of cornice.



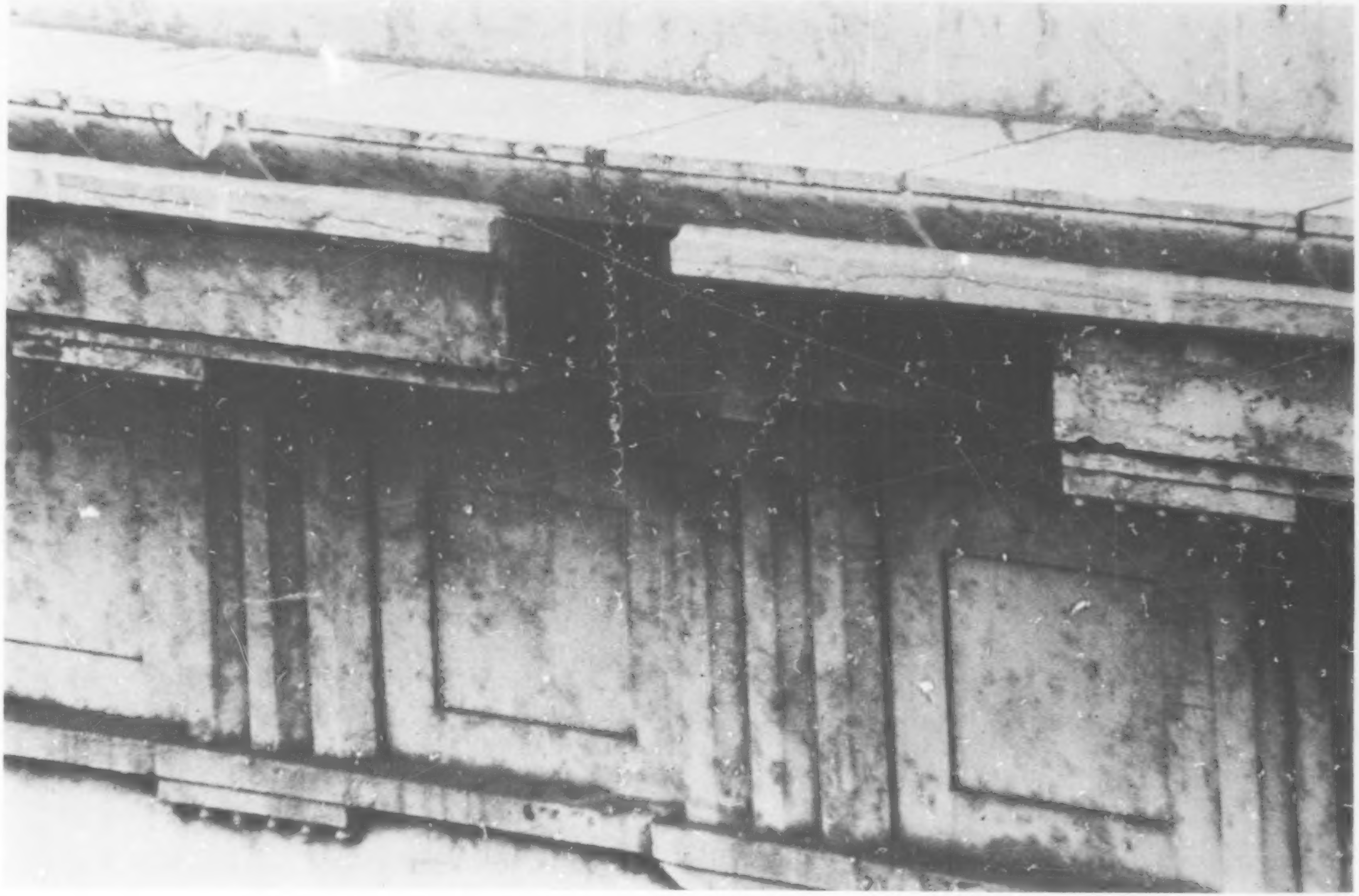
38. Typical cornice spalling.



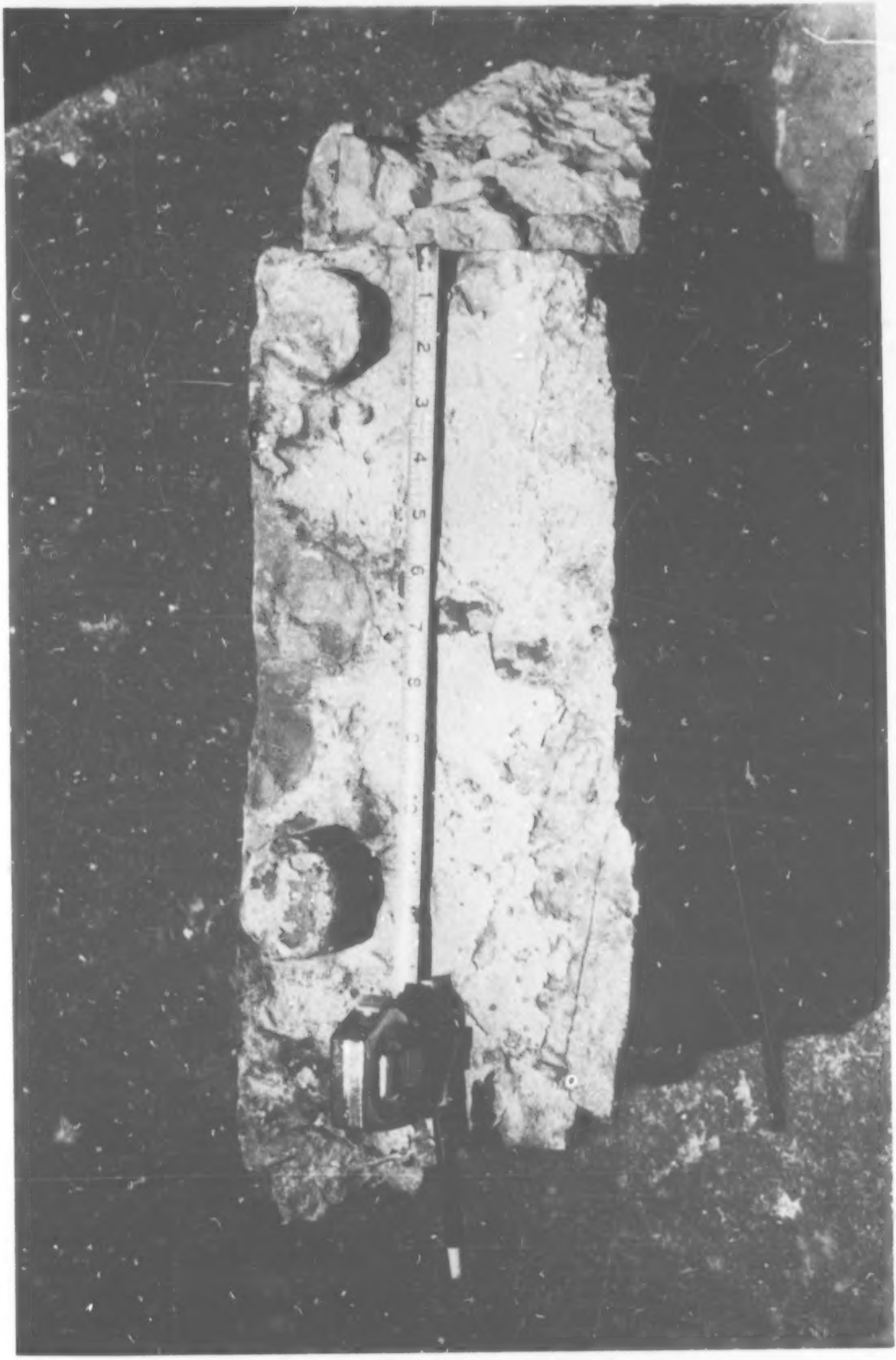
39. Typical fissures or stylolites at main cornice.



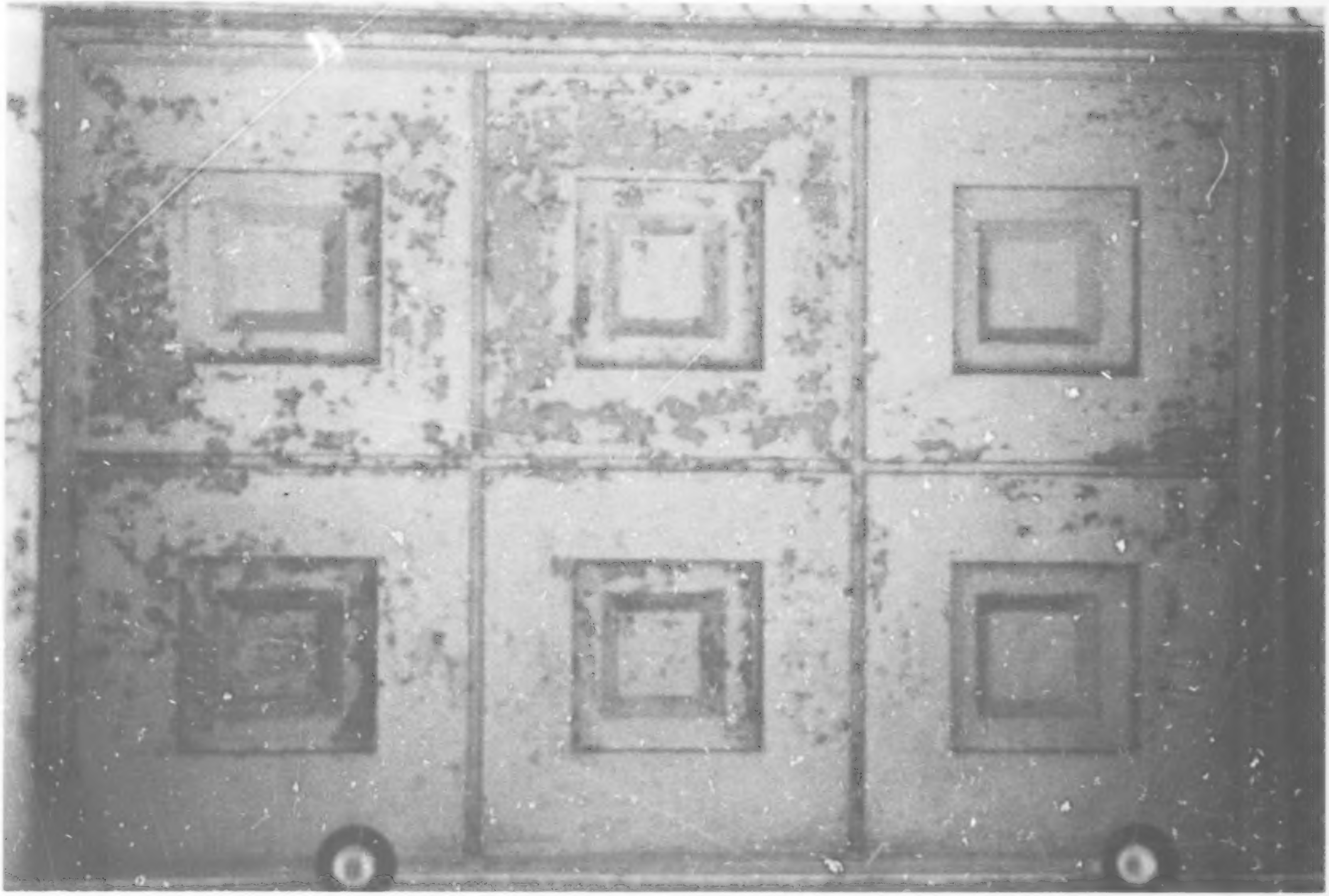
40. Top surface of cornice, parapet at right. Note replacement section beyond.



41. Missing section of cornice, north side of east wing near portico.

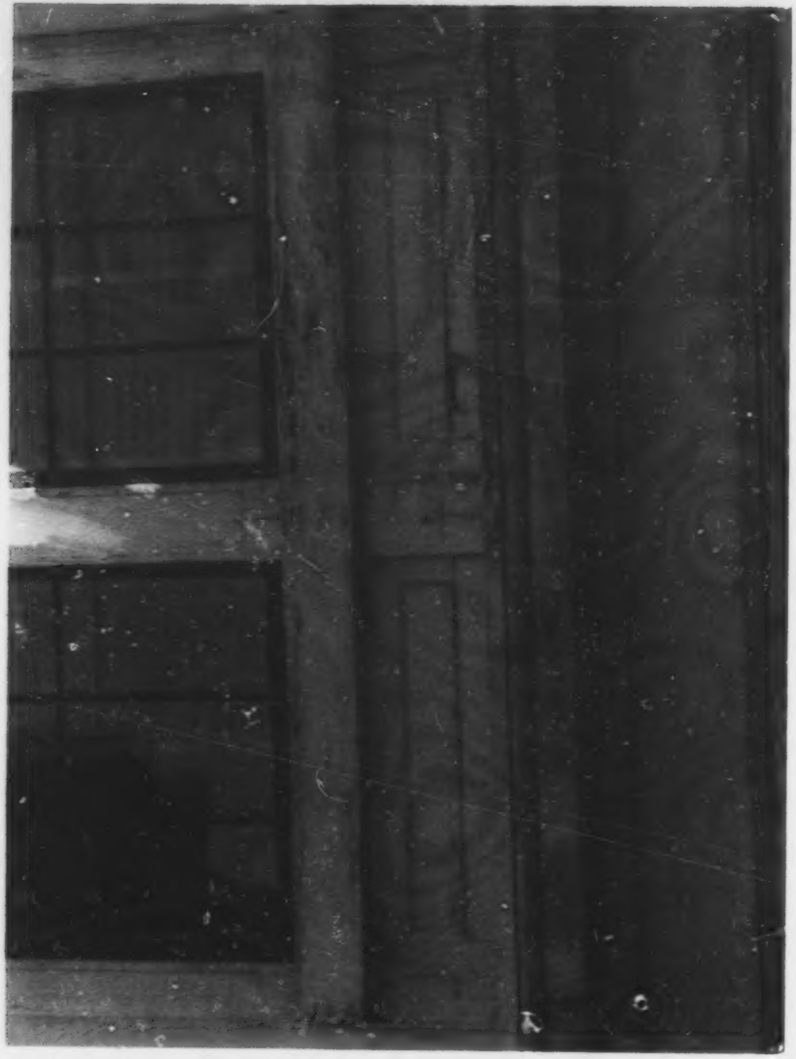


42. Fallen section of cornice from north wall, east wing.

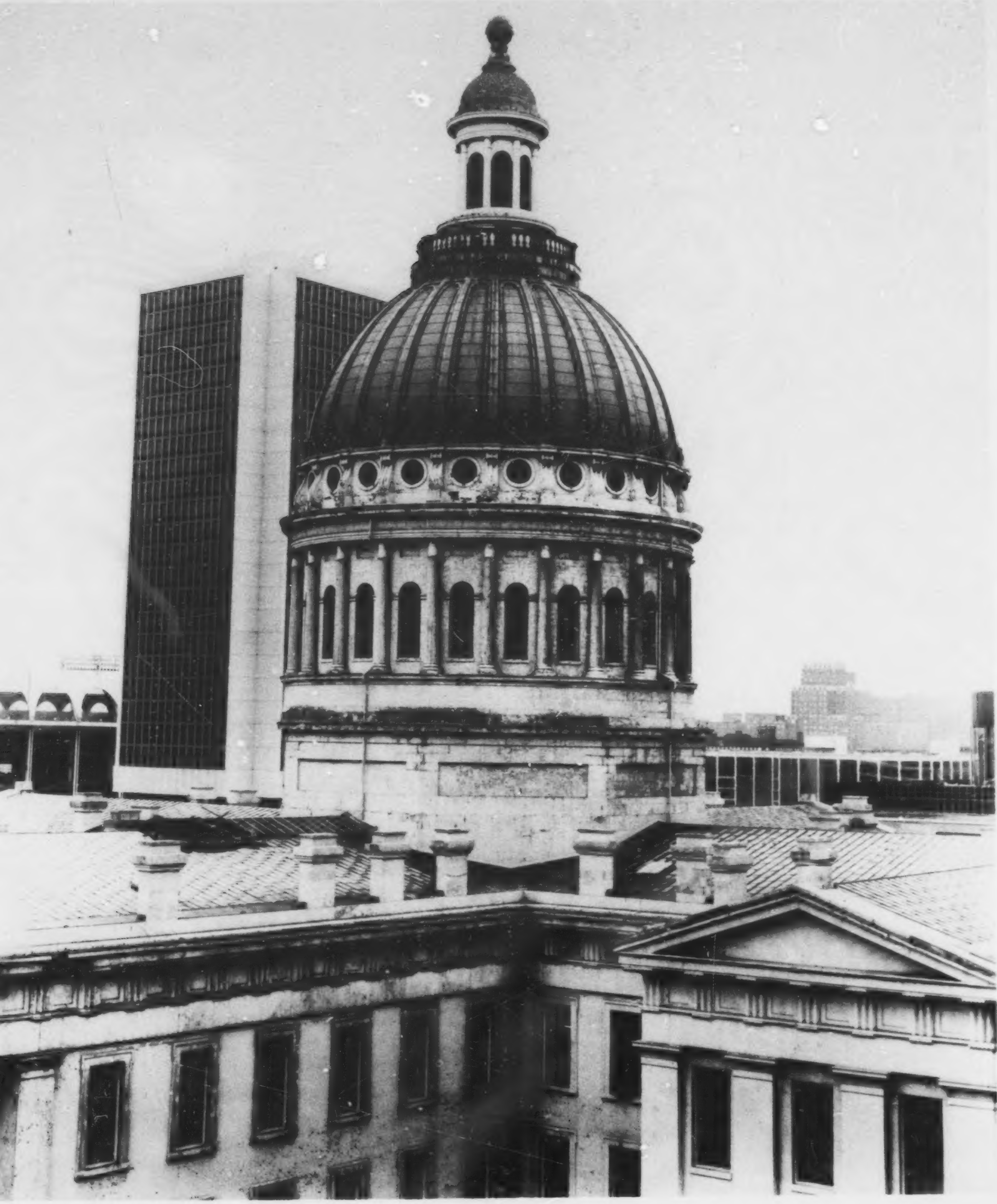


43. Typical coffer at portico ceiling.

44. Doorway, east portico main entrance. All main entrances are in good condition.

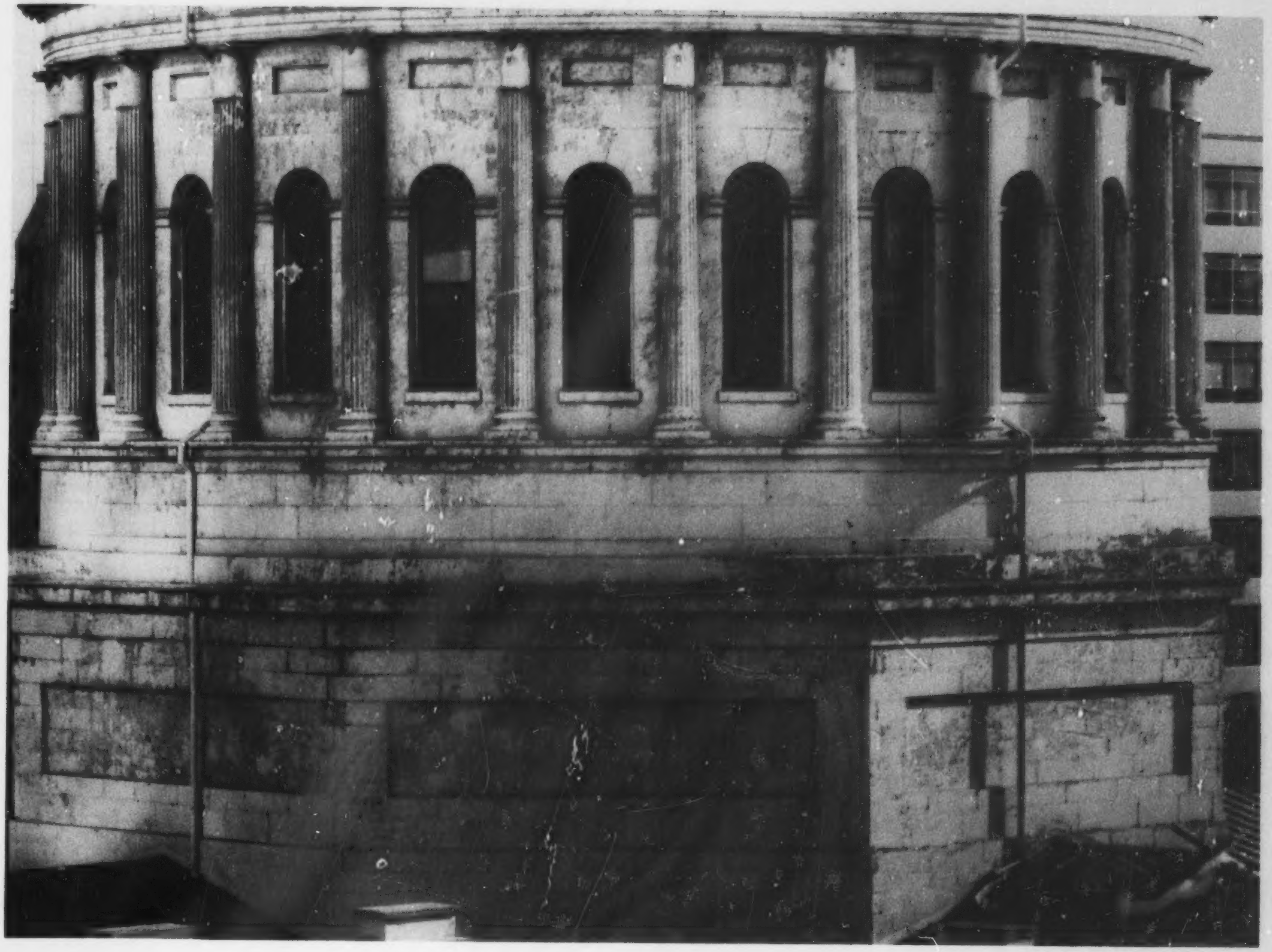


47. Typical deterioration at wooden transverse hall window infill panels.

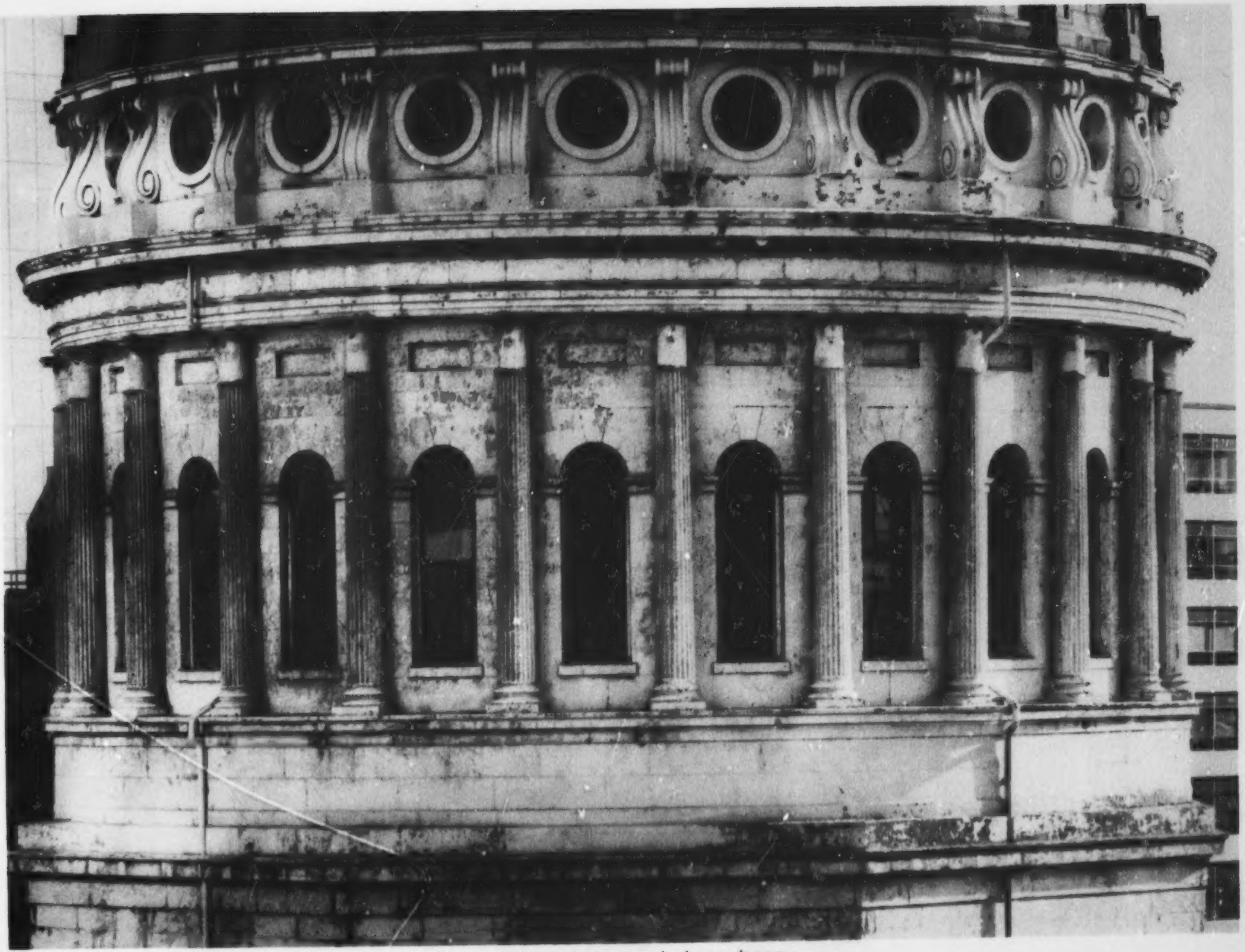


48. Lower drum, upper drum, dome, and lantern.

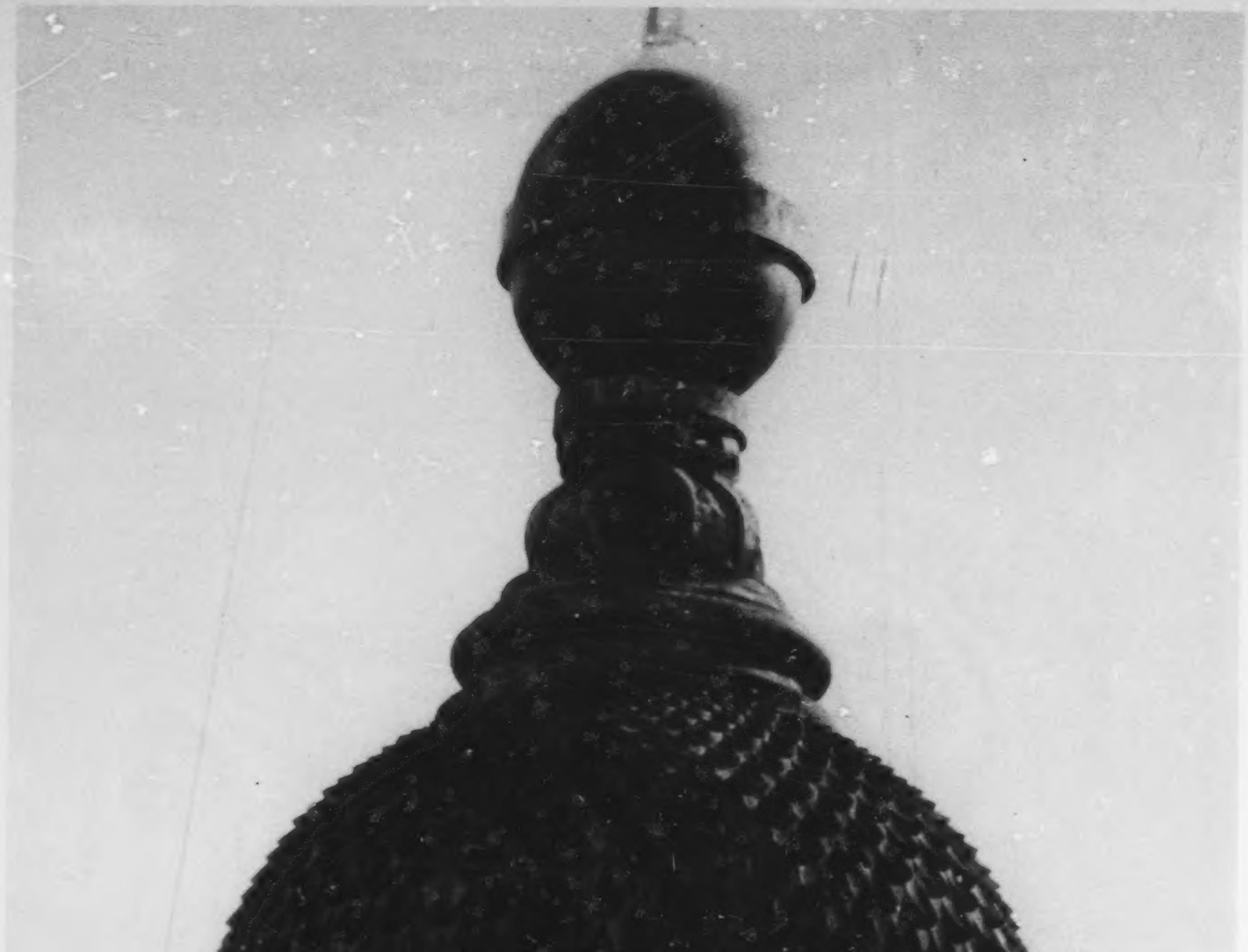
best copy available



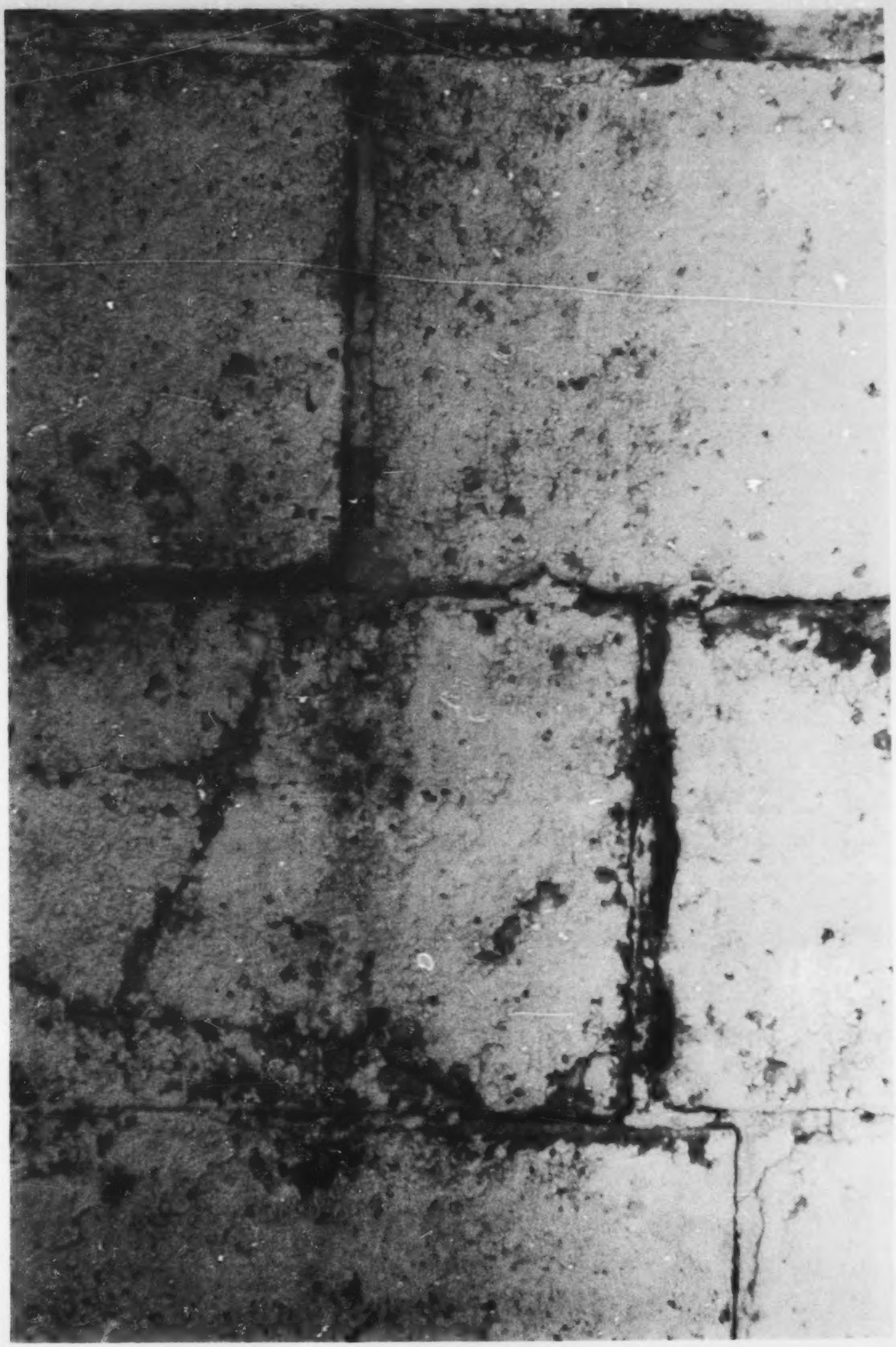
51. Lower and upper drums.



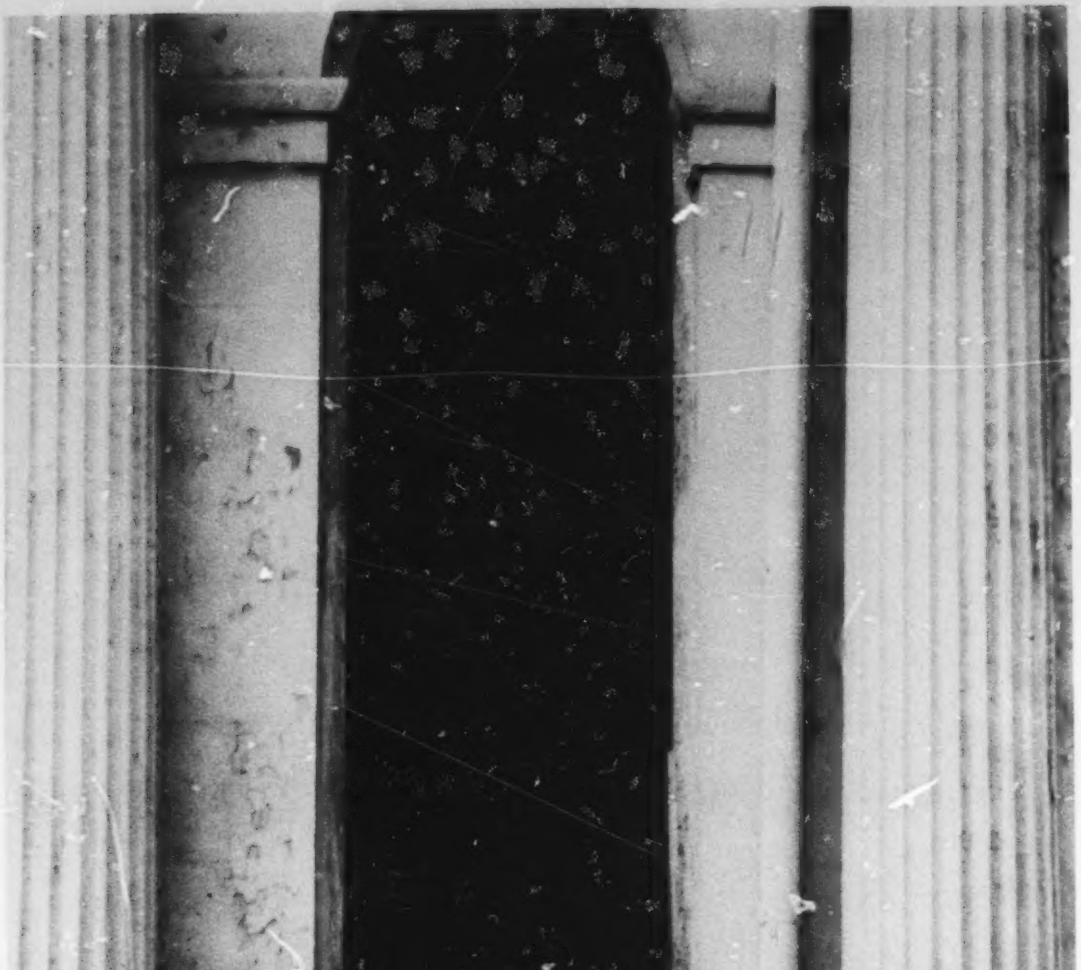
52. Upper drum and dome base.



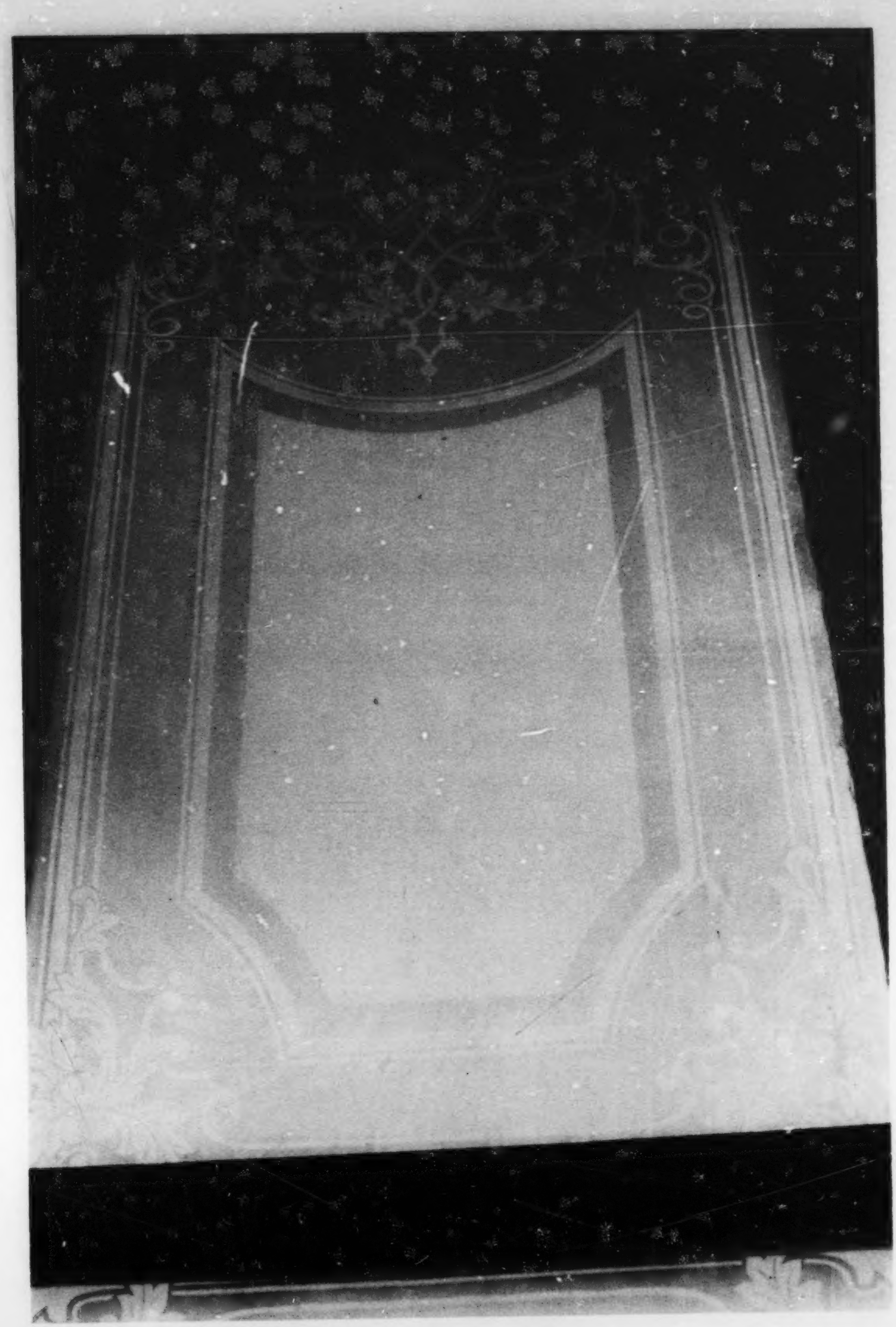
55. Lantern dome and sphere.



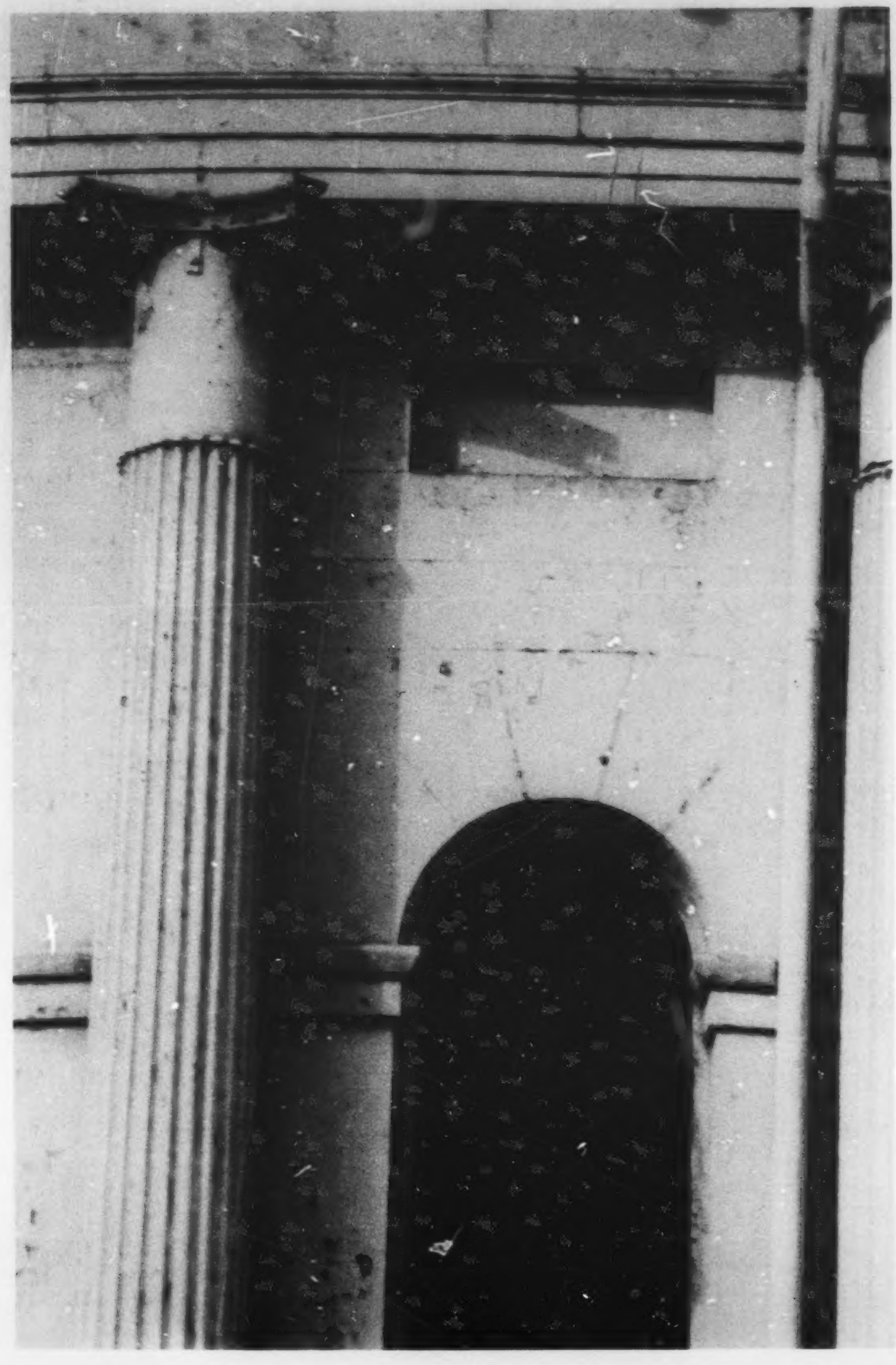
56. Detail of stone at lower drum.



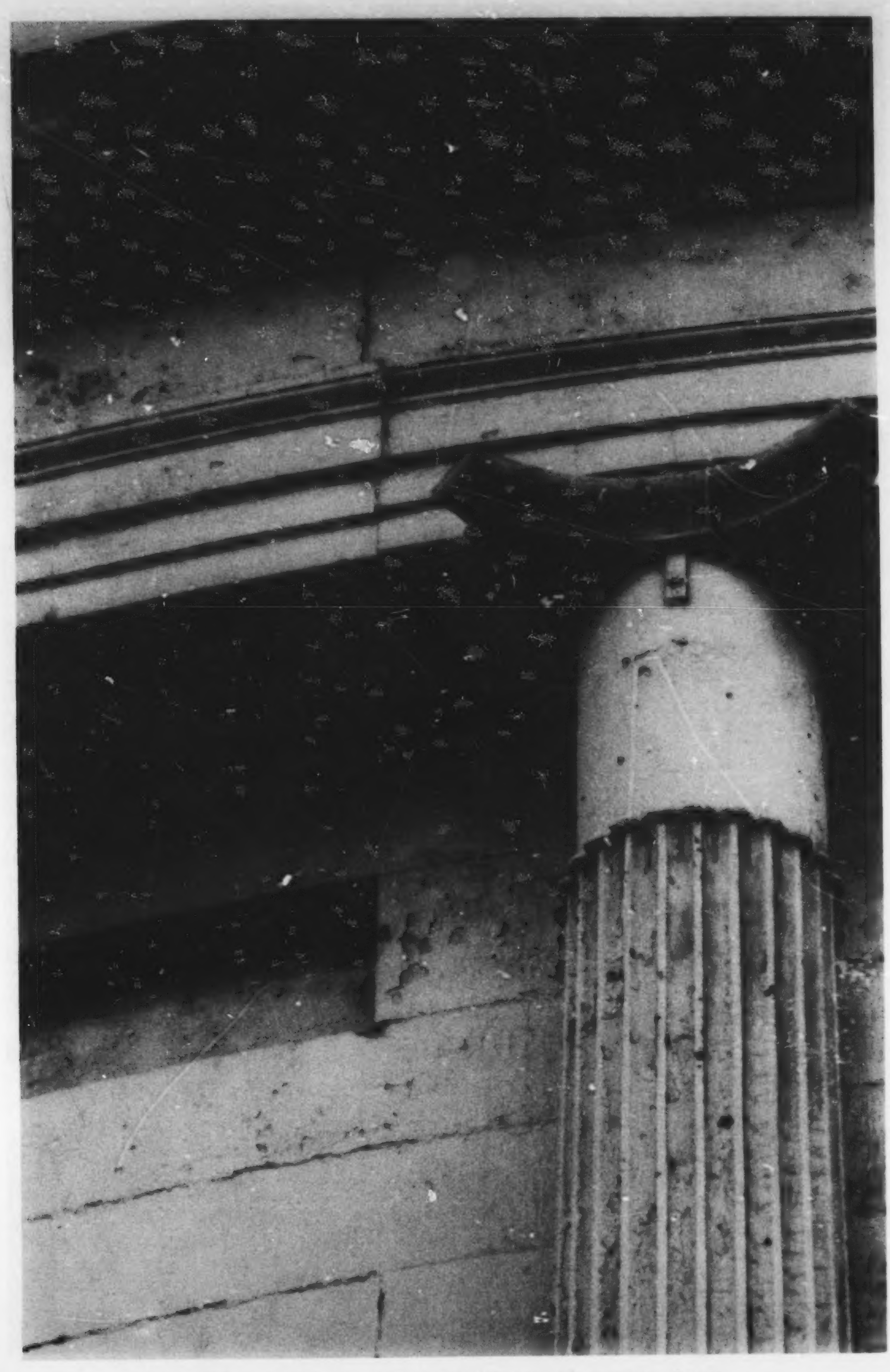
59. Upper drum and base.



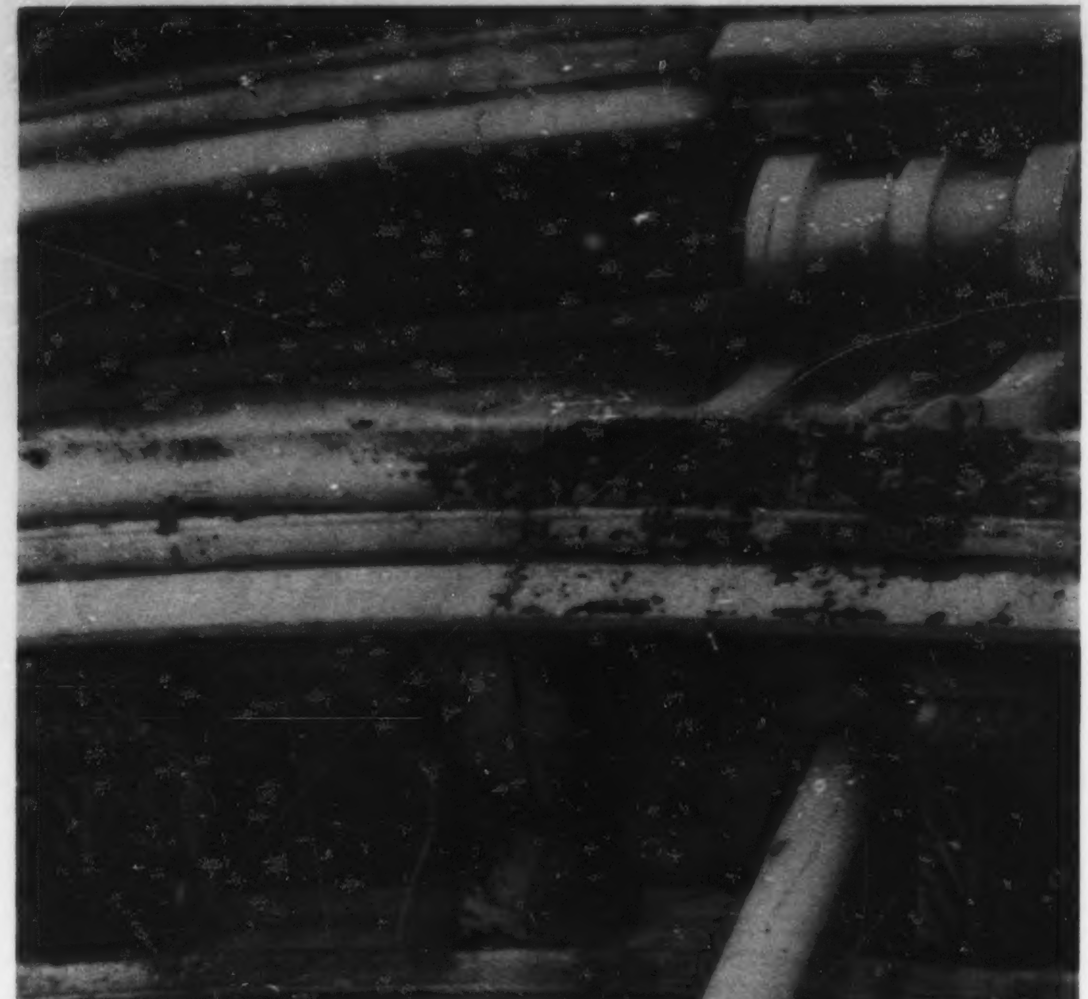
60. Etched glass in fifth level windows at upper drum.



61. Upper drum with architrave.

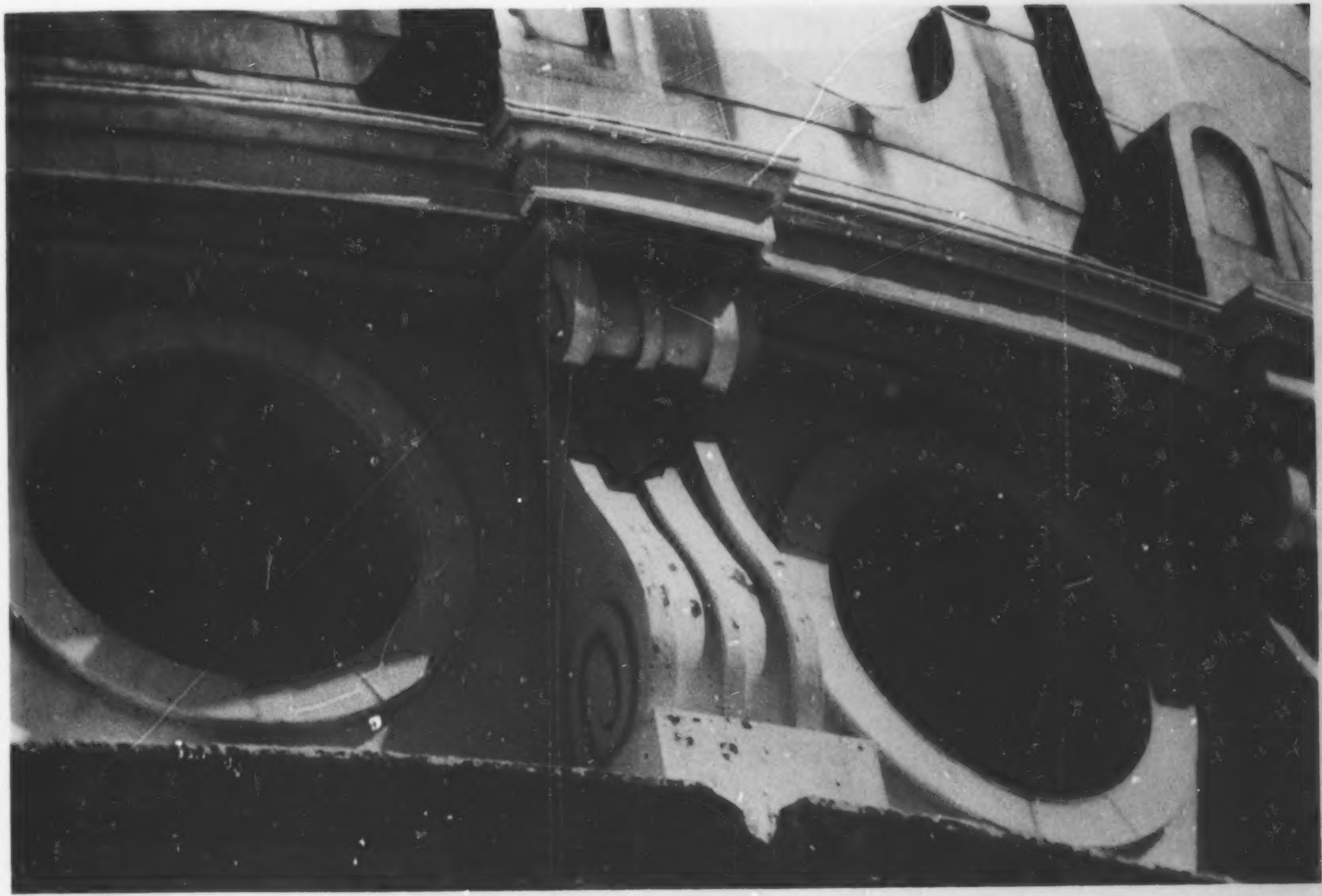


62. Column and entablature of upper drum.

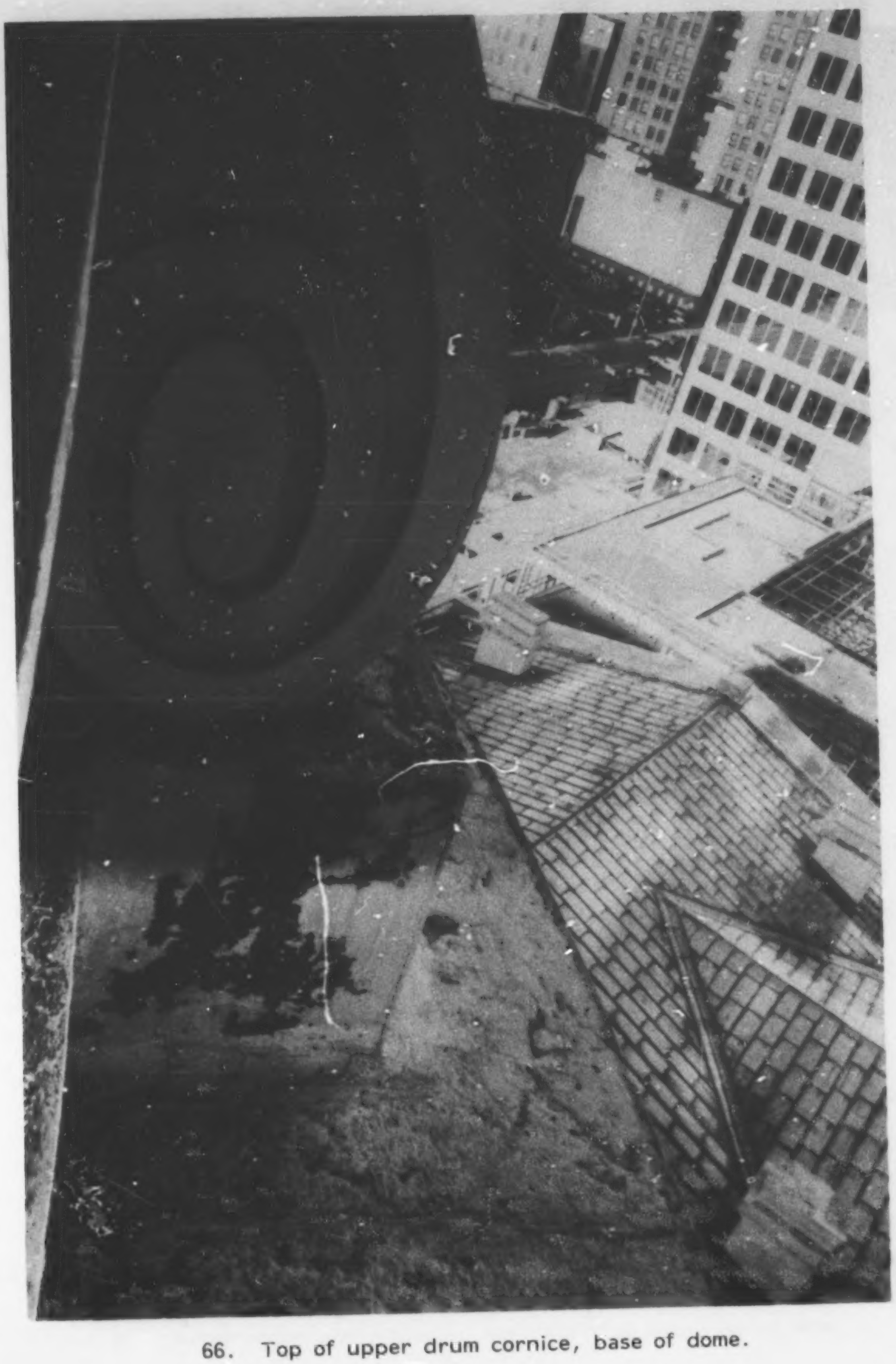


63. Top of upper drum, with base of dome above.

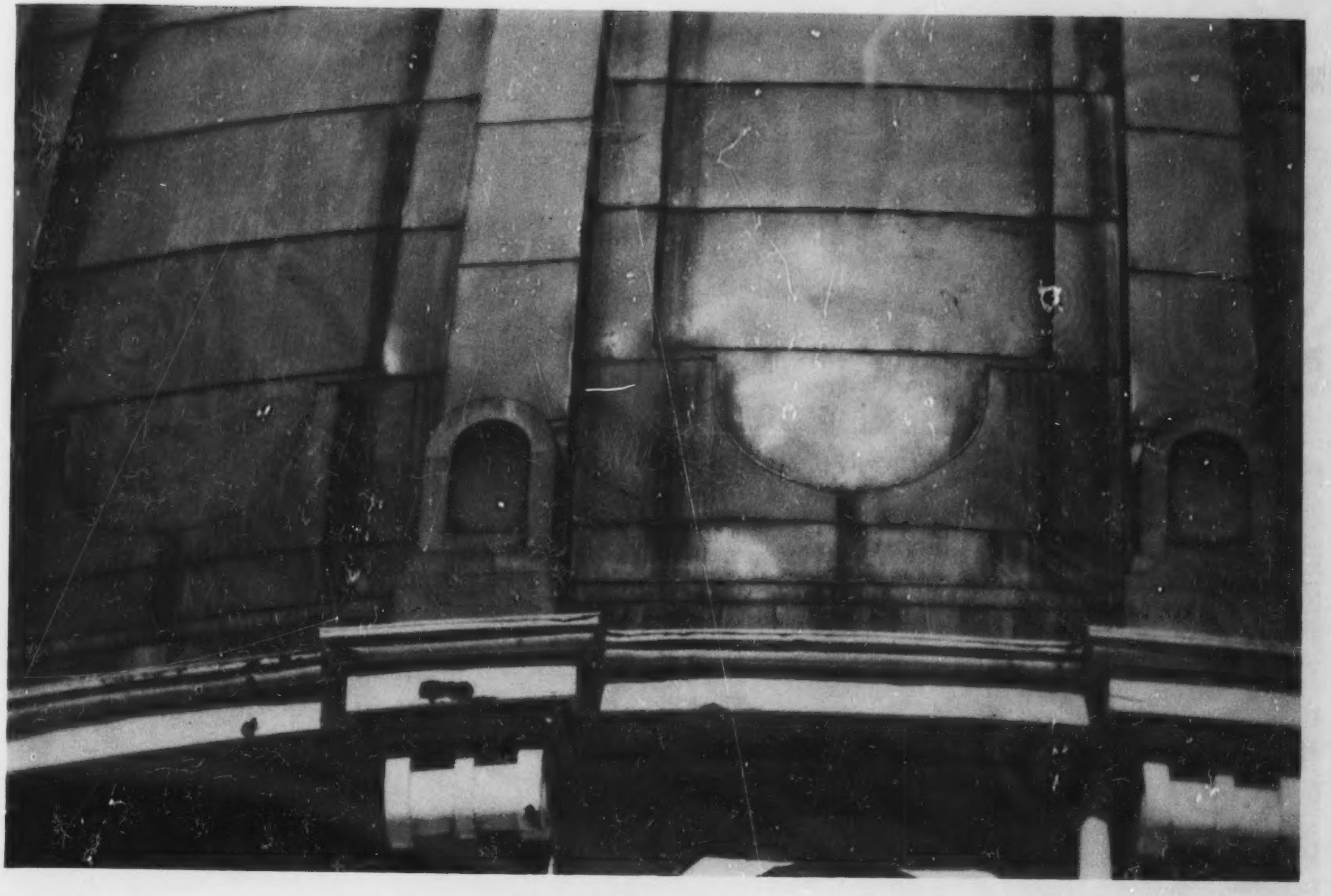
64. Top of upper drum, with dome above.



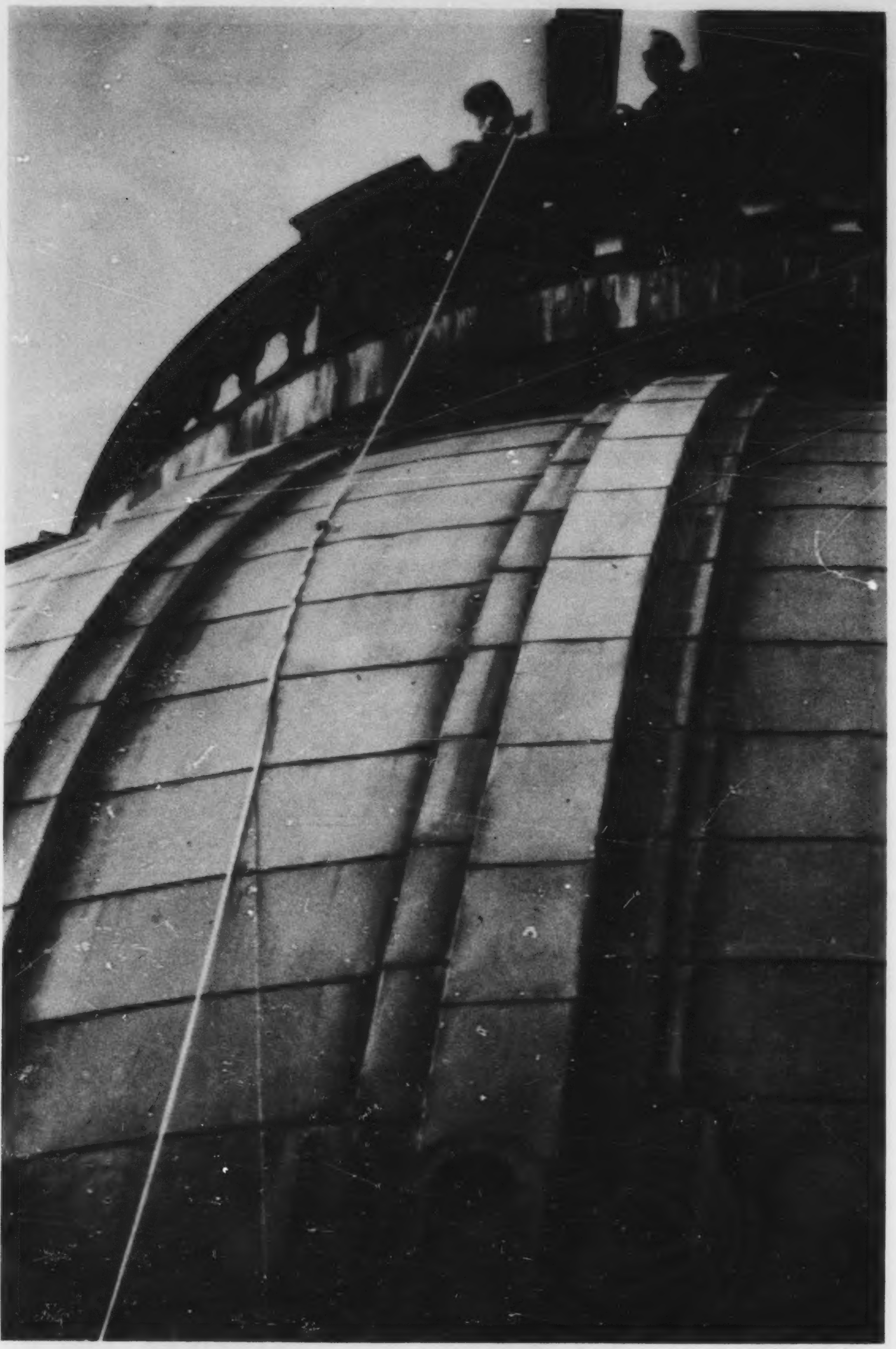
65. Base of dome with bull's-eye windows and scrolls.



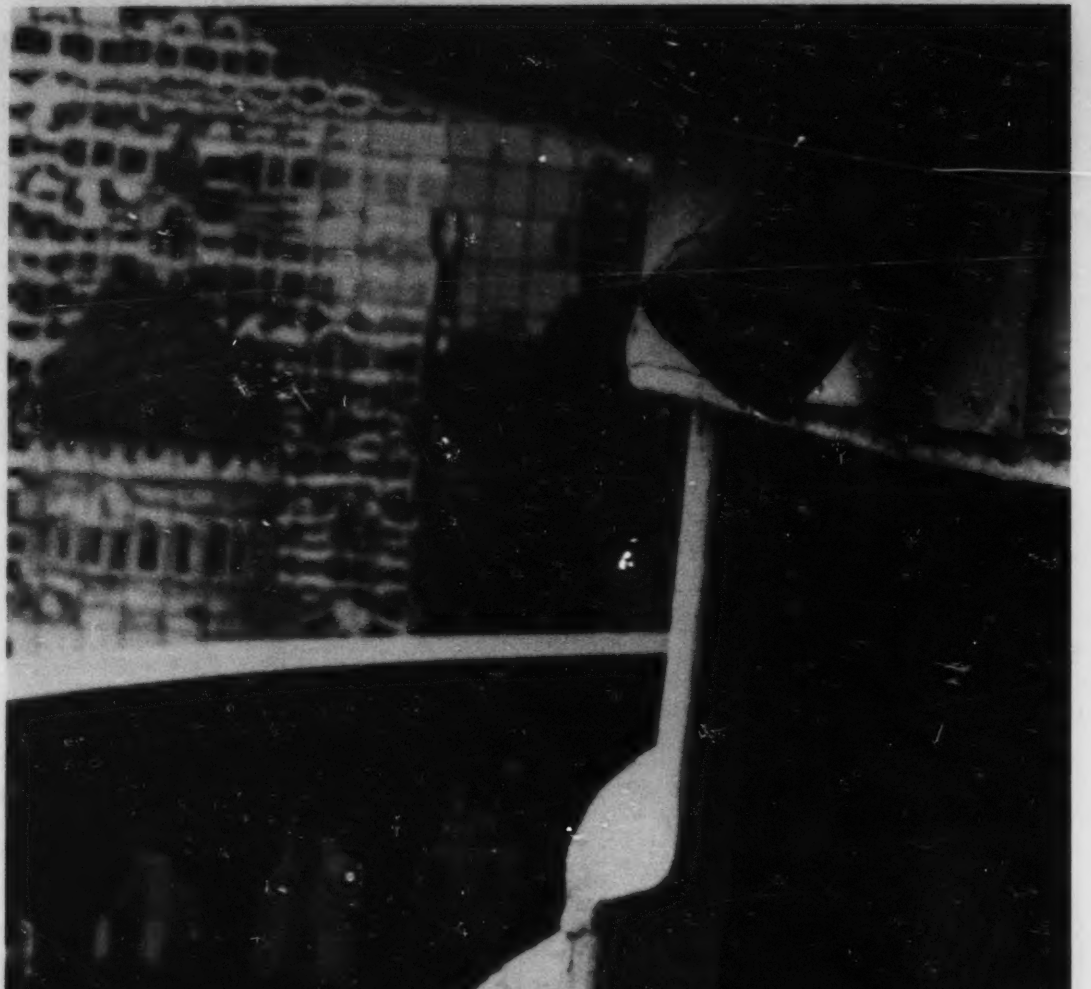
66. Top of upper drum cornice, base of dome.



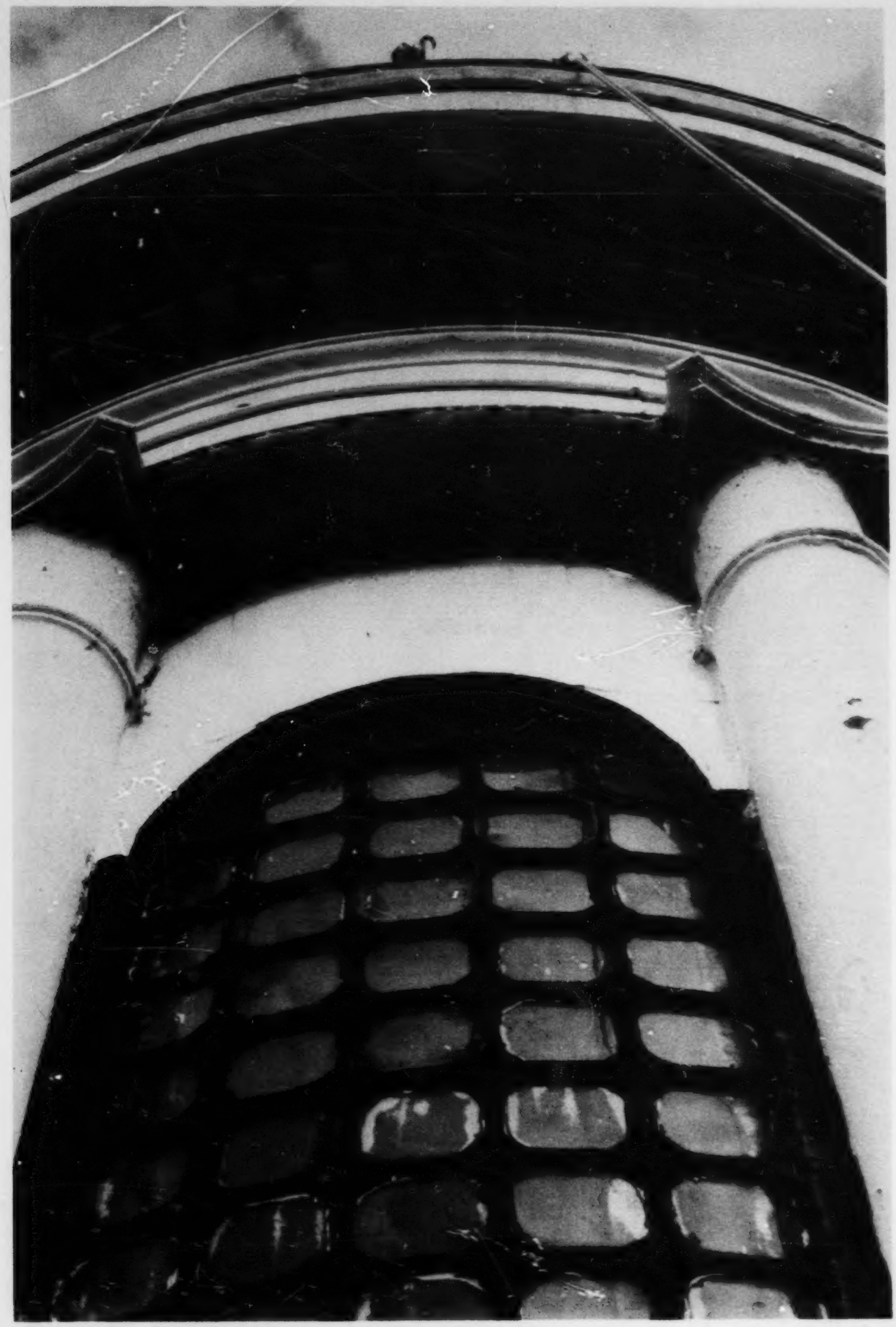
67. Lower part of dome.



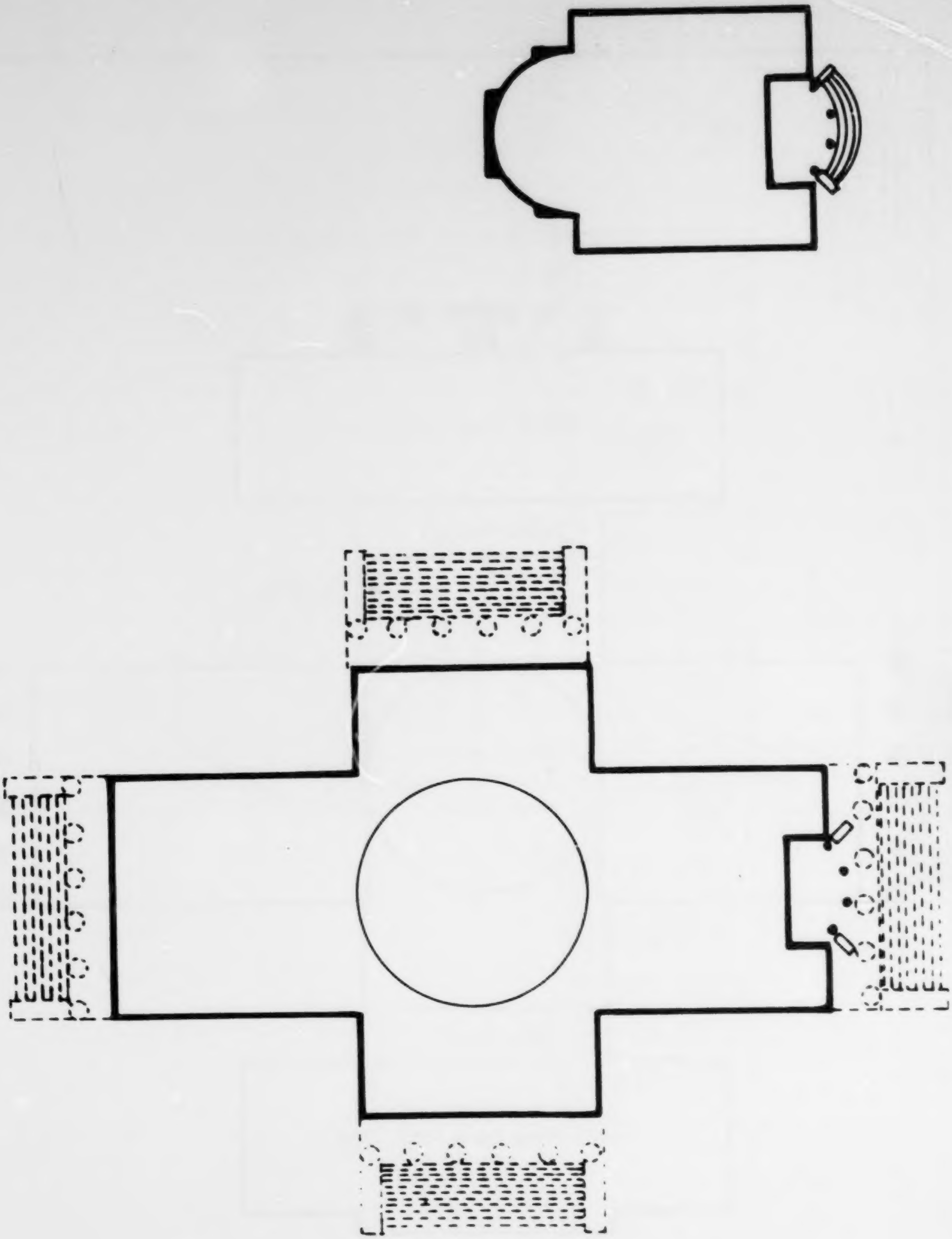
68. Upper dome and lantern. Note staining below balustrade.



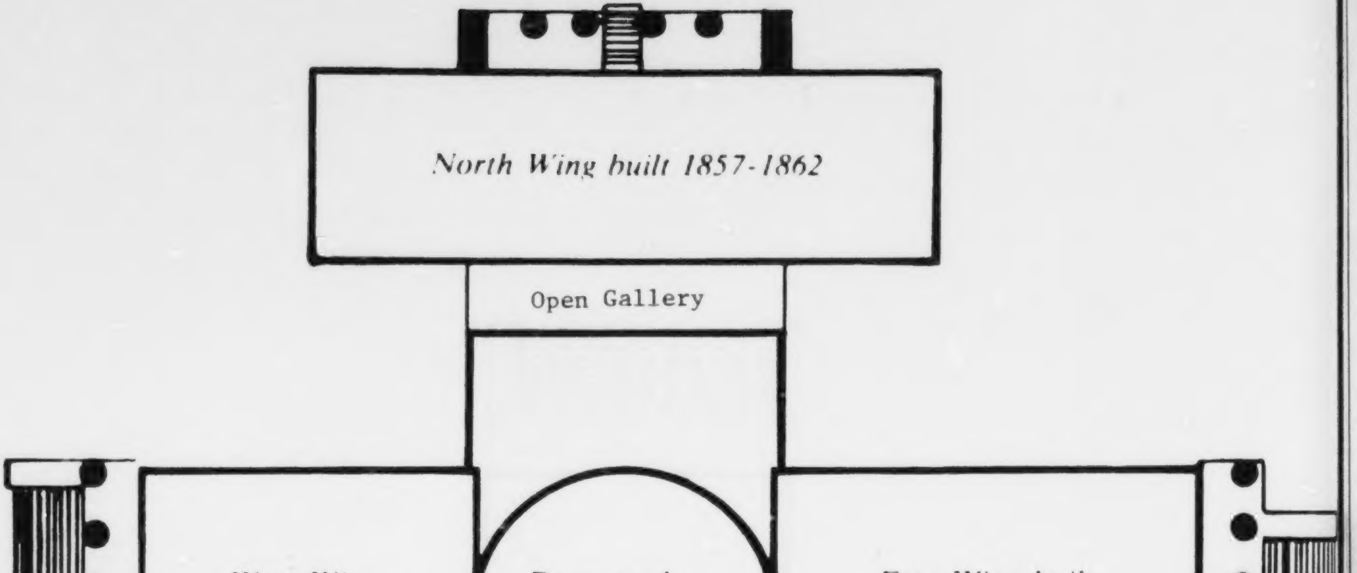
69. Base of lantern, walkway, and balustrade.



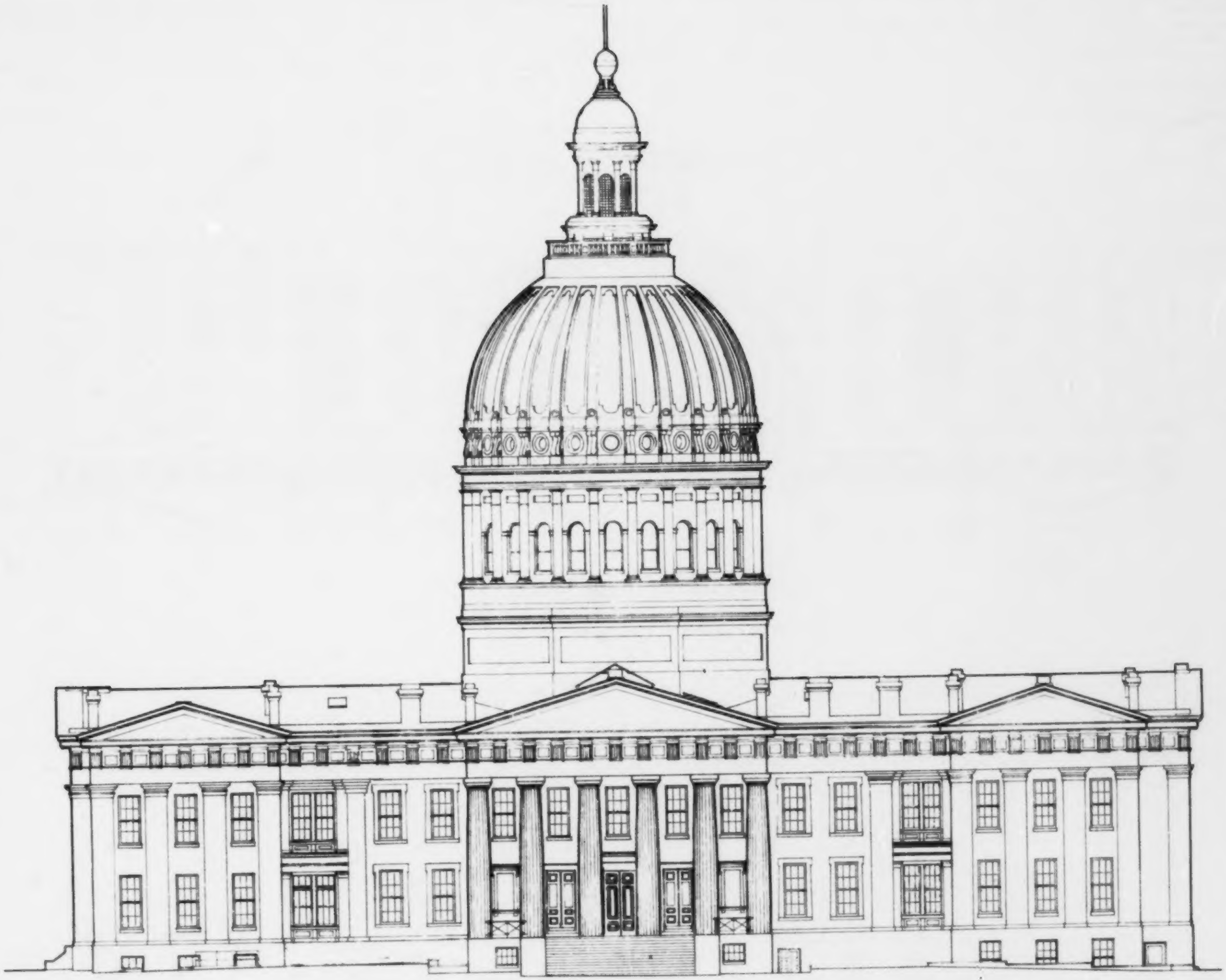
70. Cast-iron glazed section and entablature.



Chronology of construction: Top, courthouse erected 1826-1828; bottom, form of the exterior after 1845 and until 1851. The dotted lines indicate porticoes which were planned (see 1840 rendering) but not built.


North Wing built 1857-1862
Open Gallery
West Wing remodelled 1855-1860
Dome and Rotunda rebuilt 1860-1864
East Wing built 1852-1856
Open Gallery
South Wing built 1853-1858

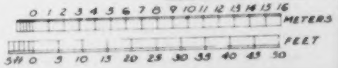
Chronology of Construction, 1852-1864.



## EAST ELEVATION

FOURTH STREET

REVISED: 3.23.81



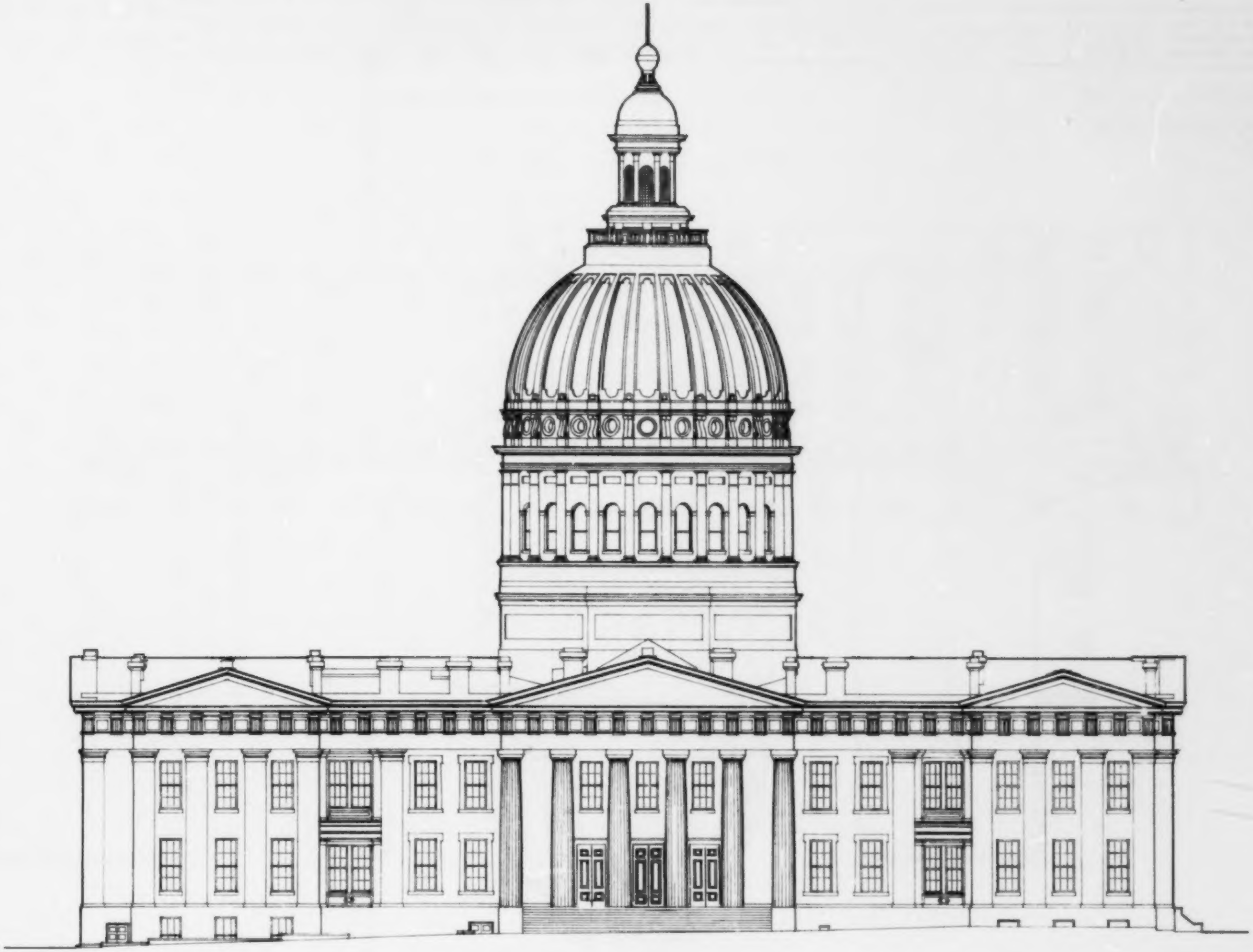
FRANK R. LESLIE - DEL.

JEFFERSON-NATIONAL-EXPANSION-MEMORIAL
UNDER DIRECTION OF UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE, BRANCH OF PLANS AND DESIGN

NAME OF STRUCTURE
- OLD ST. LOUIS COURT HOUSE -
BROADWAY, MARKET CHESTNUT
& FOURTH STREETS ST LOUIS, MO

SURVEY NO.
31-8
April, 1937

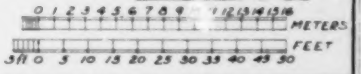
HISTORIC AMERICAN
BUILDINGS SURVEY
SHEET 22 OF 49 SHEETS



## WEST ELEVATION

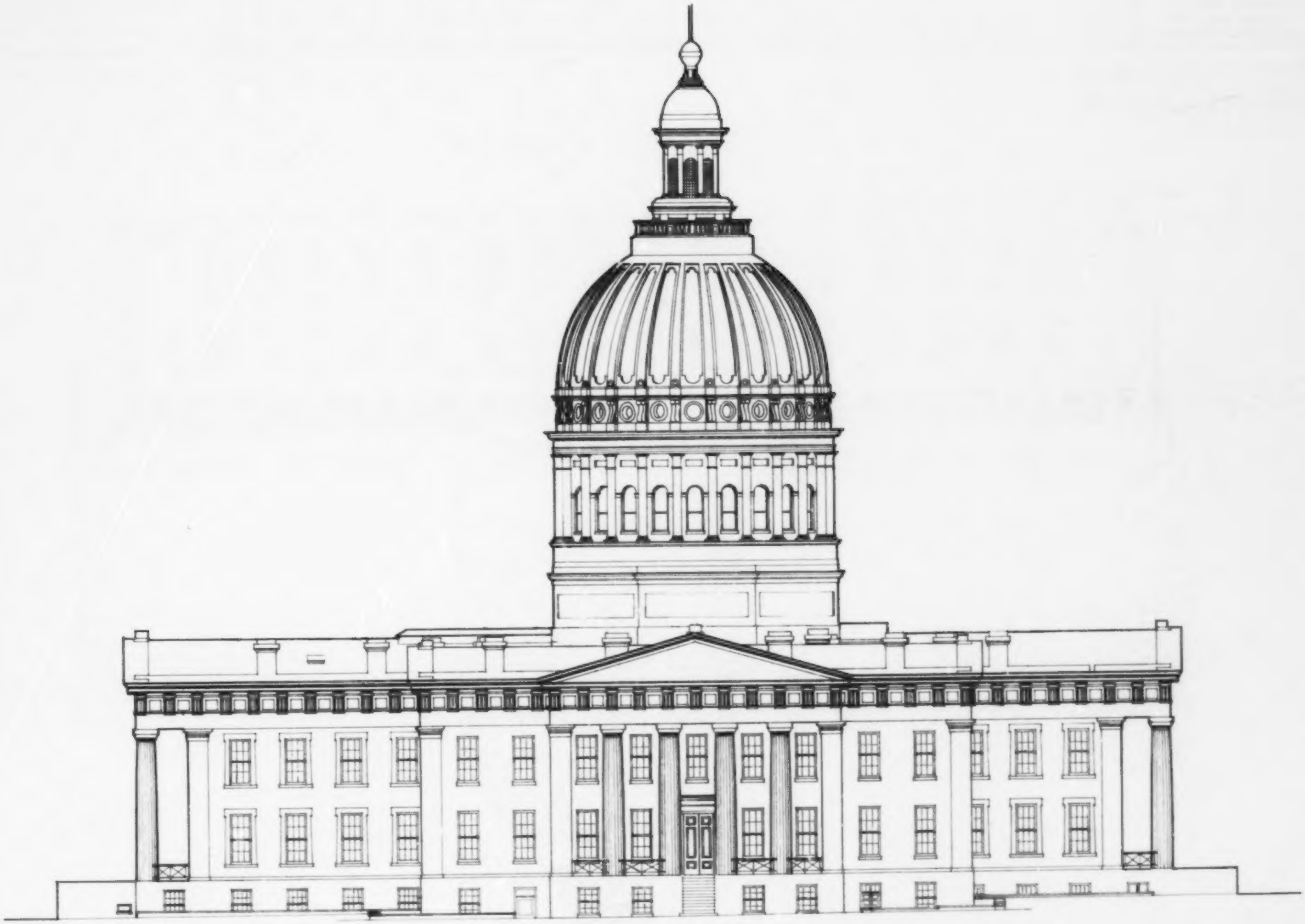
BROADWAY

REVISED: 3-23-81



FRANK R. LESLIE · DEL.

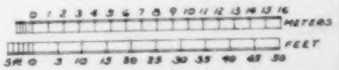
| | | | | |
|---|---|---|---|---|
| JEFFERSON·NATIONAL·EXPANSION·MEMORIAL<br>UNDER DIRECTION OF UNITED STATES DEPARTMENT OF THE INTERIOR<br>NATIONAL PARK SERVICE, BRANCH OF PLANS AND DESIGN | NAME OF STRUCTURE<br>· OLD ST. LOUIS COURT HOUSE · BROADWAY, MARKET, CHESTNUT & FOURTH STREETS, ST. LOUIS, MO. | SURVEY NO.<br>31-8<br>June 1937<br>Rev Sept 19, 1940 | HISTORIC AMERICAN<br>BUILDINGS SURVEY<br>SHEET 24 OF 49 SHEETS | |



## NORTH ELEVATION

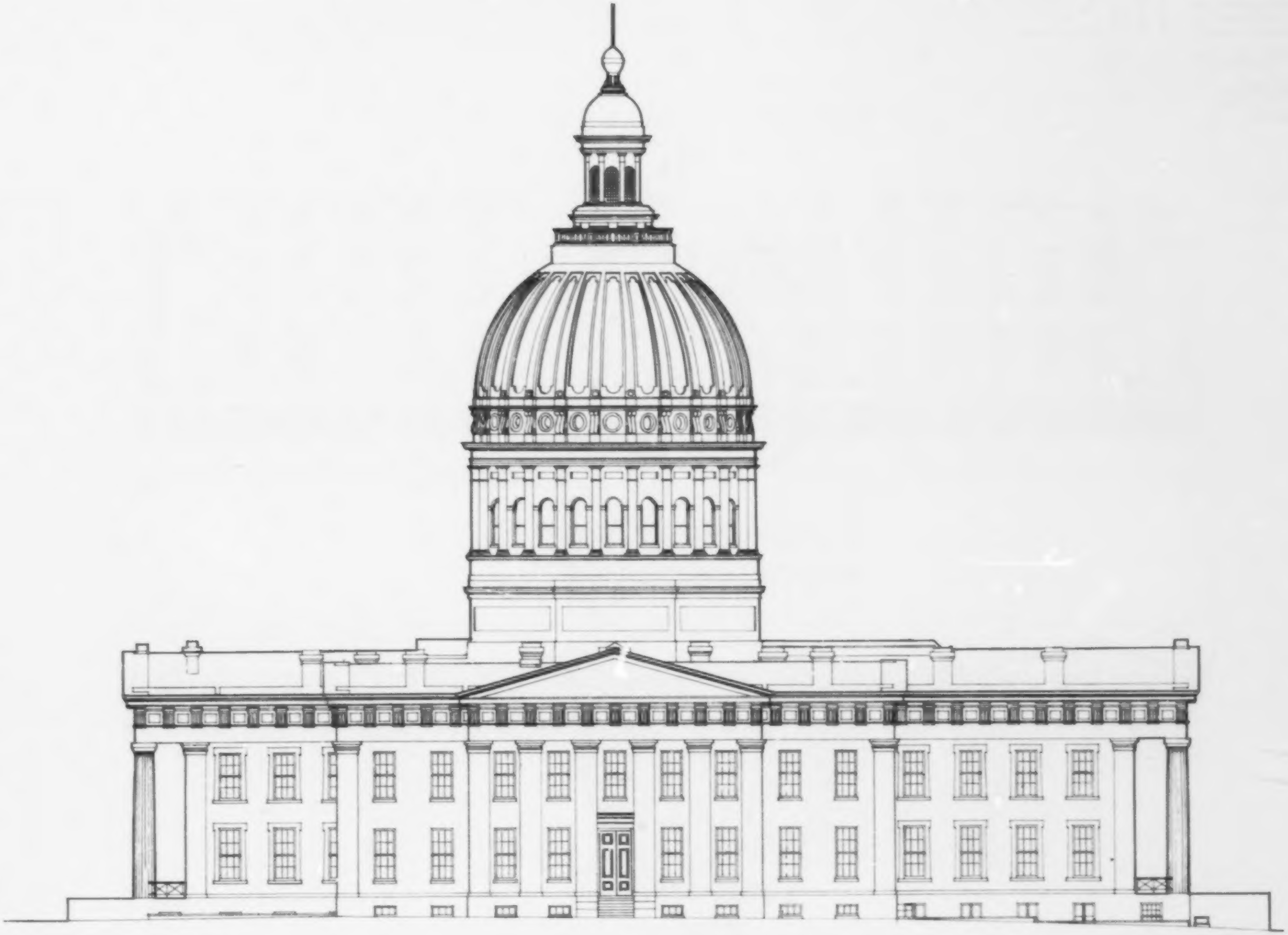
CHESTNUT ST.

REVISED: 3·23·81



G. V. DAVIS & F. R. LESLIE - DELS.

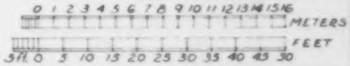
| | | | | |
|---|---|---|---|---|
| JEFFERSON-NATIONAL-EXPANSION-MEMORIAL<br>UNDER DIRECTION OF UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE. BRANCH OF PLANS AND DESIGN | NAME OF STRUCTURE<br>OLD ST. LOUIS COURT HOUSE - BROADWAY, MARKET, CHESTNUT & FOURTH STREETS, ST LOUIS, MO. | SURVEY NO.<br>31-8<br>May 1937 | HISTORIC AMERICAN BUILDINGS SURVEY<br>SHEET 23 OF 49 SHEETS | |



## SOUTH ELEVATION

MARKET ST.

REVISED: 3.23.81



G.V. DAVIS & F.R. LESLIE - DELS.

JEFFERSON·NATIONAL·EXPANSION·MEMORIAL
UNDER DIRECTION OF UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE. BRANCH OF PLANS AND DESIGN

NAME OF STRUCTURE
# OLD ST. LOUIS COURT HOUSE

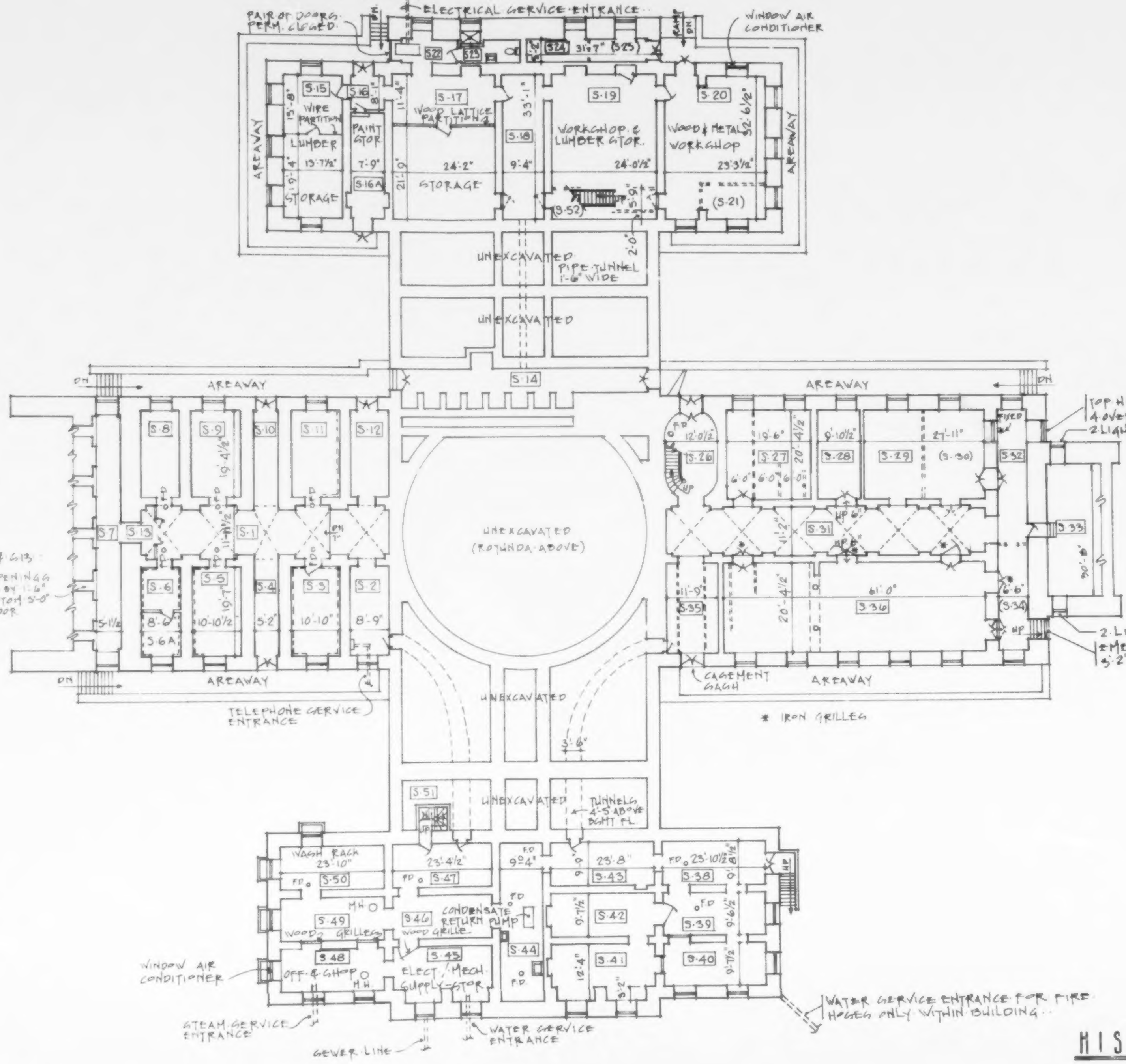
BROADWAY, MARKET, CHESTNUT
& FOURTH STREETS. ST. LOUIS, MO.

SURVEY NO.
31-8
June. 1937

HISTORIC AMERICAN
BUILDINGS SURVEY
SHEET 25 OF 49 SHEETS

NORTH·WING·NOTES:

FLOORS : S 19, S 17-S 20/21, S 24/25, CONCRETE; S 22, STONE; S 23 TERRAZO.
WALLS : RUBBLE STONE, PAINTED EXCEPT UNDER PORTICO
CEILING : AT PRINCIPAL SPACES, BRICK BARREL VAULTS ON CAST IRON BEAMS @ 5'-9" O.C.; 10" FLANGES ALL PAINTED, SPRINGING AT 9'-9" ABOVE FLOOR, CROWN AT 10'-7", RUNNING EAST-WEST. UNDER PORTICO, BRICK GROIN VAULTS, UNPAINTED.
DOORS : OPENING HEIGHT = 8'-2" (MASONRY)
WINDOWS : DOUBLE HUNG, 6 OVER 6 LIGHT, 4'-1" × 6'-3".
ROOMS : ALL PLASTERED EXCEPT S 24.



GENERAL·NOTES:

1. ROOM DIMENSIONS ARE APPROXIMATE, SEE HISTORIC AMERICAN BUILDINGS SURVEY DRAWINGS FOR DETAILED DIMENSIONS.
2. NUMBERS SHOWN THUS – (S 21) – INDICATES ROOMS WHICH WERE REMOVED AFTER 1942 OR 1955.
3. BASEMENT FLOOR TO FIRST FLOOR HEIGHT
   - EAST WING : 11'-1½"
   - NORTH WING : 11'-2"
   - WEST WING : 10'-10"
   - SOUTH WING : 11'-3½"
4. F.D. - FLOOR DRAIN

WEST·WING NOTES:

FLOORS : CONCRETE, S 1 – S 6 AND S 8 – S 13; S 7 BRICK.
WALLS : STONE, LIGHT GRAY MARBLE WAINSCOT, 6'-0" HIGH
---- INDICATES WAINSCOT MISSING
CEILINGS : BRICK VAULTS, PAINTED. EAST-WEST CORRIDOR S 1, S 13, GROIN VAULTS, SPRINGING AT 6'-6" ABOVE FLOOR. CROWN AT 9'-7". AT SPACES S 2-S 6 AND S 8-S 12, BARREL VAULTS SPRINGING AT 6'-3", CROWN AT 9'-7". PLASTERED EXCEPT S 2, S 7, S 12 & S 13.
SPACE S 7 : BRICK FLOOR, BRICK VAULT CEILING 9'-8", SPRINGING AT 6'-9". WEST WALL CONTAINS INVERTED STONE REINFORCING ARCHES, SPRINGING AT 6'-9".
DOORS : HEIGHT = 8'-5" (MASONRY)
WINDOWS : DOUBLE HUNG, 8 OVER 8 LIGHT 4'-1" × 5'-4"

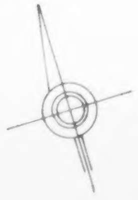
EAST WING NOTES:

FLOORS : STONE, EXCEPT S 28 AND PARTS OF S 26, S 35 AND S 36, CONCRETE; S 33, EARTH
WALLS : RUBBLE STONE OR BRICK, PAINTED
CEILINGS : AT CORRIDOR, BRICK GROIN VAULTS, SPRINGING AT 7'-7" ABOVE FLOOR, CROWN AT 9'-10". AT NORTH AND SOUTH SPACES, BARREL VAULTS ON CAST IRON BEAMS AT 6'-0", 6" FLANGES, SPRINGING AT 10'-4", CROWN AT 11'-6". ALL BEAMS AND VAULTS PAINTED. AT S 33, BRICK HALF BARREL VAULT
DOORS : HEIGHT = 8'-2" (MASONRY) ABOVE CORRIDOR FLOOR.
WINDOWS : NORTH AND SOUTH WALLS, DOUBLE HUNG, 8 OVER 8 LIGHT, 4'-1" × 5'-4"
ROOMS : S 27, S 28, S 29, S 35, & S 36, PLASTERED. WINDOW REVEALS HEAD AND JAMBS - 3⅛" BEADED T&G BOARDS; STONE SILLS.

SOUTH WING NOTES:

FLOORS : CONCRETE, S 38, S 43-S 51; BRICK ON GRADE, S 39 - S 42 FLOOR AND BASE, PAINTED GRAY AT S 45-S 51, RED AT S 44
WALLS : RUBBLE STONE TO 7'-4" ABOVE FLOOR, PAINTED WHITE AT CENTER AND WEST SPACES.
CEILINGS : BRICK BARREL VAULTS SPRINGING FROM EAST-WEST WALLS, CROWN AT 10'-0". PAINTED WHITE.
DOORS : HEIGHT = 7'-6" (MASONRY)
WINDOWS : ALL TOP HINGED, 3 LIGHT, 4'-8" × 2'-4"
ROOMS : S 44 THROUGH S 50, PLASTERED.

# HISTORIC·STRUCTURE·REPORT



## EXISTING·CONDITIONS: BASEMENT·PLAN
## OLD·COURTHOUSE: J·N·E·M

DRAWN·AT·1/16" = 1'-0"

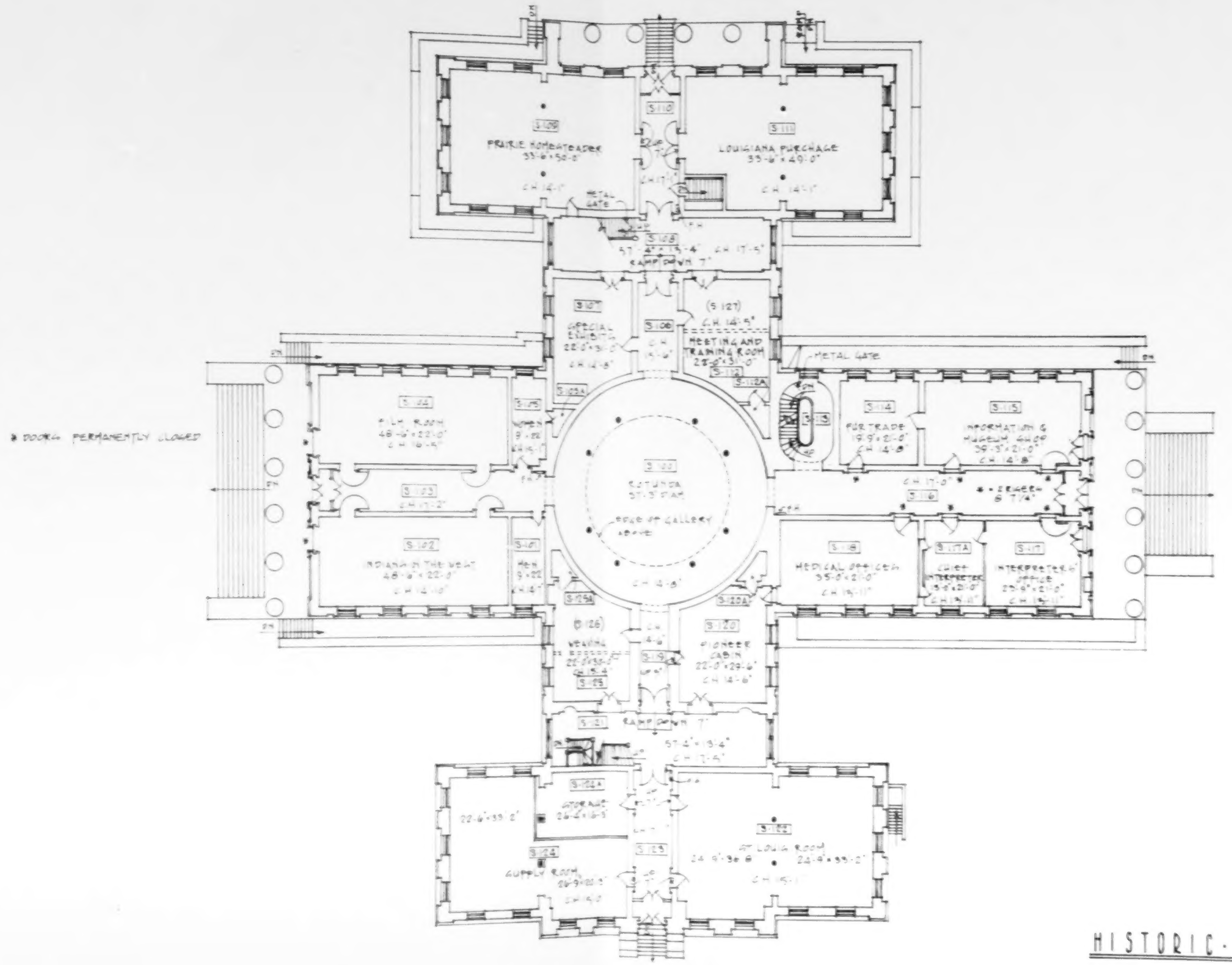
GRAPHIC 0 4 6 8 12 16 FEET

PREPARED

DESIGNED
HENDERSON
SCHERER
DRAWN
HENDERSON
CHECKED
FEB. 1981
DATE

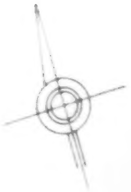
| DRAWING NO. | |
|---|---|
| 366<br>28002 | |
| PKG | SHEET |
| 224 | 1 |
| | OF 8 |

★ GPO 1977 701 786



GENERAL NOTES:

1. ROOM DIMENSIONS ARE APPROXIMATE. SEE HISTORIC AMERICAN BUILDINGS SURVEY DRAWINGS FOR DETAILED DIMENSIONS.
2. EXHIBIT STRUCTURES AND FURRING, COUNTERS, ETC. OMITTED FOR CLARITY.
3. ● = CAST IRON COLUMNS.
4. NUMBERS SHOWN THUS -(S-127)- INDICATES ROOMS WHICH WERE REMOVED AFTER 1941 OR 1955.
5. FIRST FLOOR TO SECOND FLOOR HEIGHT AT EAST STAIR = 20'-1"
6. C.H. = CEILING HEIGHT
7. F.H. = FIRE HOSE



# HISTORIC · STRUCTURE · REPORT

## EXISTING · CONDITIONS · 1ST · FLOOR · PLAN
## OLD · COURTHOUSE · J · N · E · M

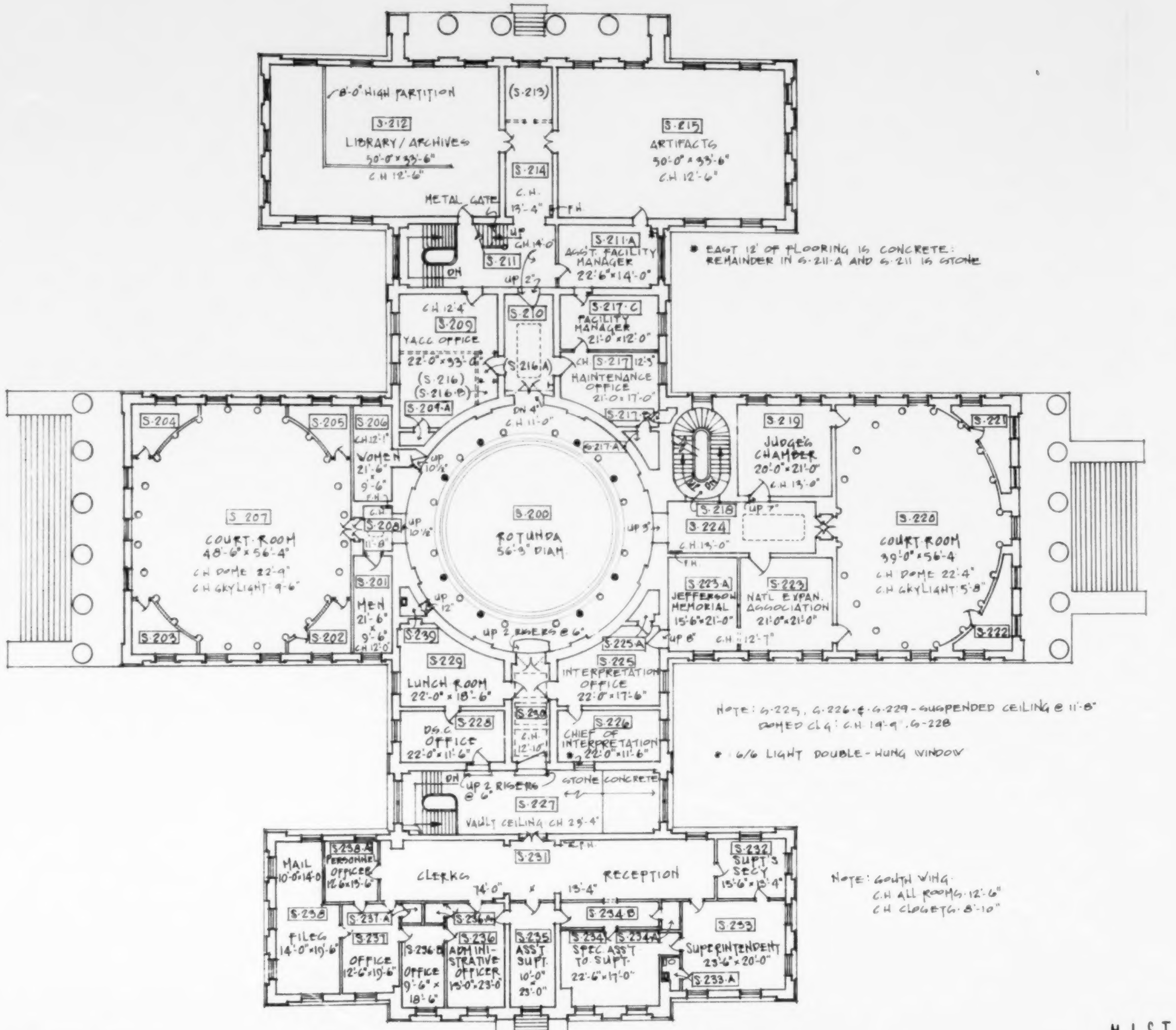
DRAWN · AT · 1/16" = 1'-0"

GRAPHIC: 0 4 8 12 16 32

ROOM USES INDICATED UP TO JANUARY 1, 1980

| PREPARED | DRAWING NO. |
|---|---|
| HENDERSON<br>DESIGNED<br>SCHERER<br>DRAWN<br>HENDERSON<br>CHECKED<br>FEB. 1981<br>DATE | 366<br>28002 |
| | PKG. 224 |
| | SHEET 2 OF 8 |

GPO 1977



● EAST 12' OF FLOORING IS CONCRETE:
REMAINDER IN S·211·A AND S·211 IS STONE

NOTE: S·225, S·226 & S·229 - SUSPENDED CEILING @ 11'-8"
DOMED CLG: C.H 19'-9", S-228

● 6/6 LIGHT DOUBLE-HUNG WINDOW

NOTE: SOUTH WING
C.H ALL ROOMS 12'-6"
C.H CLOSETS 8'-10"

GENERAL·NOTES:

1. ROOM·DIMENSIONS ARE APPROXIMATE. · SEE HISTORIC·AMERICAN BUILDINGS SURVEY DRAWINGS FOR DETAILED DIMENSIONS.
2. ● = CAST IRON STRUCTURAL COLUMNS AT ROTUNDA.
○ = WOOD ARCHITECTURAL COLUMNS.
3. NUMBERS SHOWN THUS - (S·216) - INDICATE ROOMS WHICH WERE REMOVED AFTER 1942 OR 1955.
4. SECOND FLOOR TO THIRD FLOOR HEIGHT AT EAST STAIR = 13'-8".
5. C.H = CEILING HEIGHT.
6. F.H. = FIRE HOSE
7. ⊢ = FIRE ALARM PULL BOX

# HISTORIC·STRUCTURE·REPORT

## EXISTING·CONDITIONS·2ND·FLOOR·PLAN
## OLD·COURTHOUSE·J·N·E·M

DRAWN·AT·1/16" = 1'-0"

GRAPHIC· 0 4 8 12 16 20

| PREPARED | DRAWING NO. |
|---|---|
| DESIGNED | 366<br>28,002 |
| HENDERSON<br>SCHERER<br>DRAWN | PKG 224 |
| HENDERSON<br>CHECKED | SHEET 3 |
| FEB. 1981<br>DATE | OF 8 |

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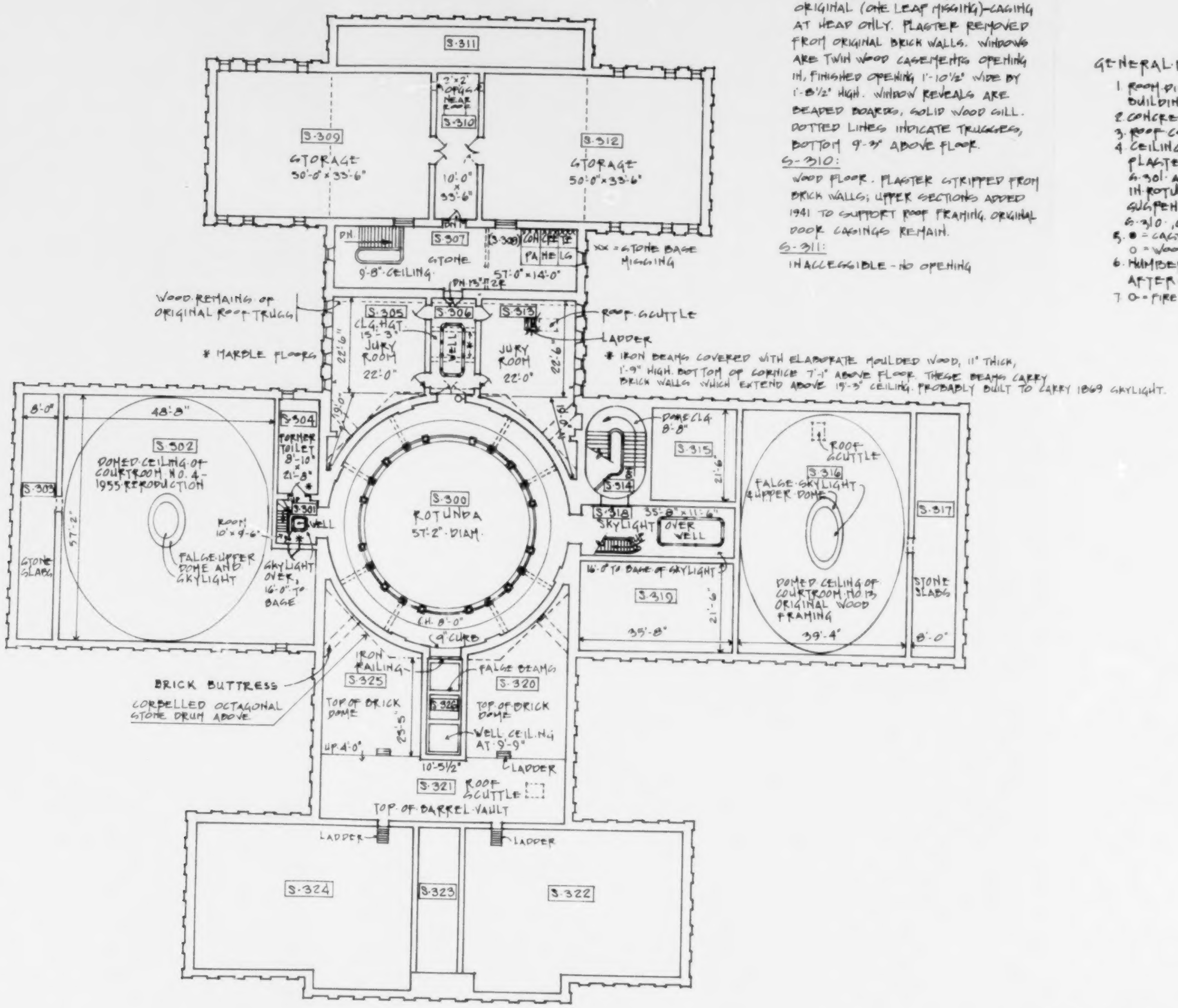


S-309, S-312:

EXPOSED STEEL 1941 ROOF FRAMING, TOP OF RIDGE BEAM 15'-0"; TOP OF WALL 9'-3". CONCRETE FLOOR INSTALLED 1946. DOORS TO S-310 PROBABLY ORIGINAL (ONE LEAF MISSING)—CASING AT HEAD ONLY. PLASTER REMOVED FROM ORIGINAL BRICK WALLS. WINDOWS ARE TWIN WOOD CASEMENTS OPENING IN, FINISHED OPENING 1'-10½" WIDE BY 1'-8½" HIGH. WINDOW REVEALS ARE BEADED BOARDS, SOLID WOOD SILL. DOTTED LINES INDICATE TRUSSES, BOTTOM 9'-3" ABOVE FLOOR.

S-310:

WOOD FLOOR. PLASTER STRIPPED FROM BRICK WALLS; UPPER SECTIONS ADDED 1941 TO SUPPORT ROOF FRAMING. ORIGINAL DOOR CASINGS REMAIN.

S-311:

INACCESSIBLE - NO OPENING

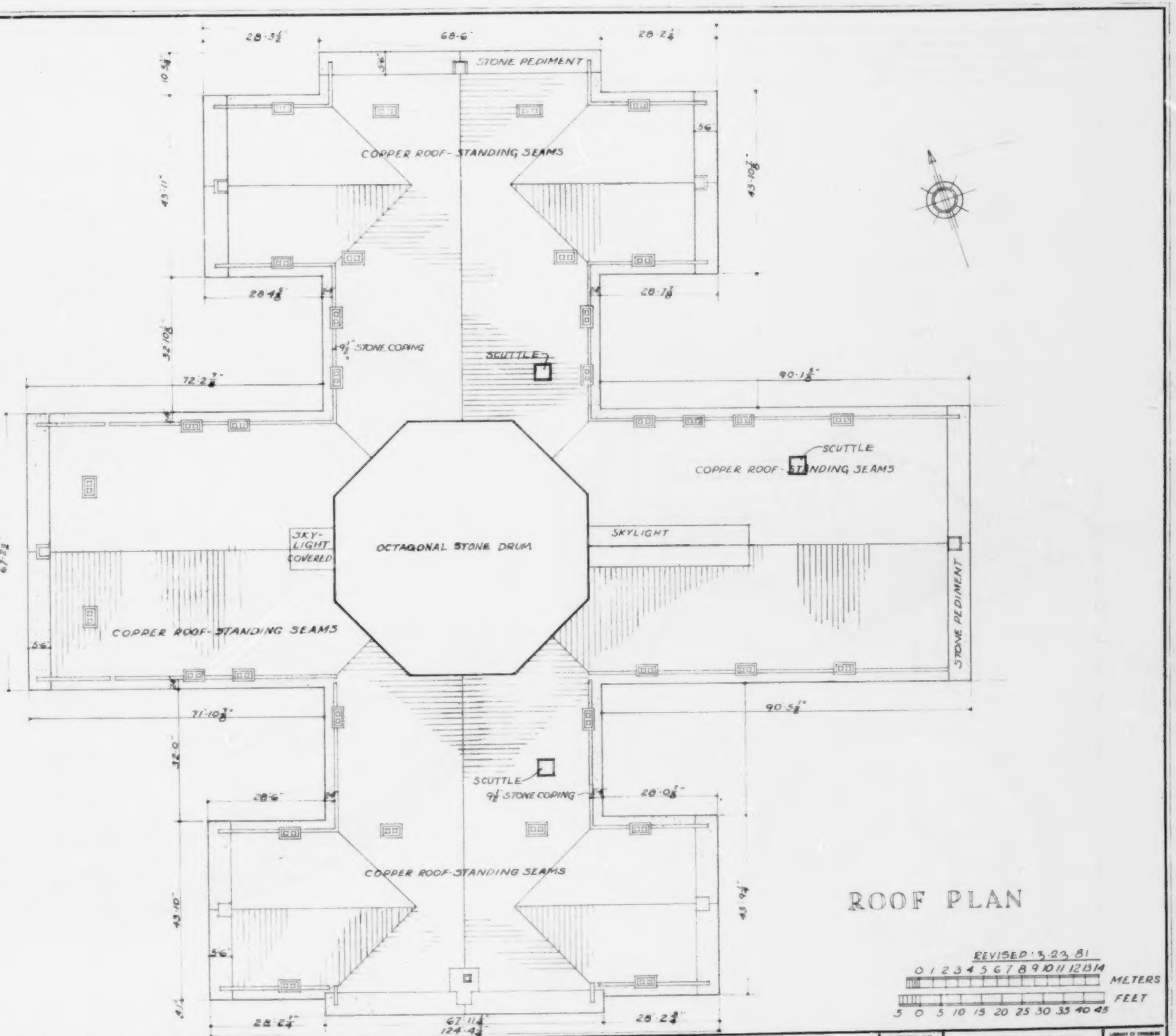
GENERAL NOTES:

1. ROOM DIMENSIONS ARE APPROXIMATE. SEE HISTORIC AMERICAN BUILDINGS SURVEY FOR DETAILED DIMENSIONS.
2. CONCRETE FLOORS AT S·304-S·310, S·312, AND S·313.
3. ROOF CONSTRUCTION: STEEL BEAMS AND TRUSSES, GYPSUM PLANK.
4. CEILINGS: SUSPENDED PLASTER AT S·306-S·308 AND S·326; DOMED PLASTER CEILING AT STAIR S·314. PLASTER CORNICES BELOW SKYLIGHTS S·301 AND S·318. PLASTER AT UNDERSIDE OF FOURTH LEVEL GALLERY IN ROTUNDA. SPACES S·302, S·315, S·316, S·319, S·322-S·324 CONTAIN SUSPENDED CEILINGS AT SECOND FLOOR. CEILINGS AT S·304, S·305, S·309, S·310, S·312 AND S·313 HAVE BEEN REMOVED.
5. ● = CAST IRON STRUCTURAL COLUMNS AT ROTUNDA
   ○ = WOOD ARCHITECTURAL COLUMNS AT ROTUNDA.
6. NUMBERS SHOWN THUS -(S·308)- INDICATES ROOMS WHICH WERE REMOVED AFTER 1942 OR 1955.
7. O = FIRE ALARM BELL

## HISTORIC·STRUCTURE·REPORT

EXISTING·CONDITIONS·3RD·FLOOR·PLAN
OLD·COURTHOUSE·J·N·E·M
DRAWN·AT·1/16" = 1'-0"
GRAPHIC· 1 4 6 8 12 16 20

| PREPARED | DRAWING NO. | |
|---|---|---|
| ~~DESIGNED~~ | 366 / 28002 | |
| HENDERSON ~~SCHEERD~~ DRAWN | PKG | SHEET |
| HENDERSON CHECKED | 224 | 4 |
| FEB. 1981 DATE | | OF 8 |



# ROOF PLAN

FRANK R. LESLIE·DEL.

JEFFERSON·NATIONAL·EXPANSION·MEMORIAL
UNDER DIRECTION OF UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE, BRANCH OF PLANS AND DESIGN

NAME OF STRUCTURE
· OLD ST. LOUIS COURT HOUSE · BROADWAY, MARKET, CHESTNUT & FOURTH STREETS, ST. LOUIS, MO.

SURVEY NO. 31-8
MAR 1937

HISTORIC AMERICAN
BUILDINGS SURVEY
SHEET 21 OF 49 SHEETS

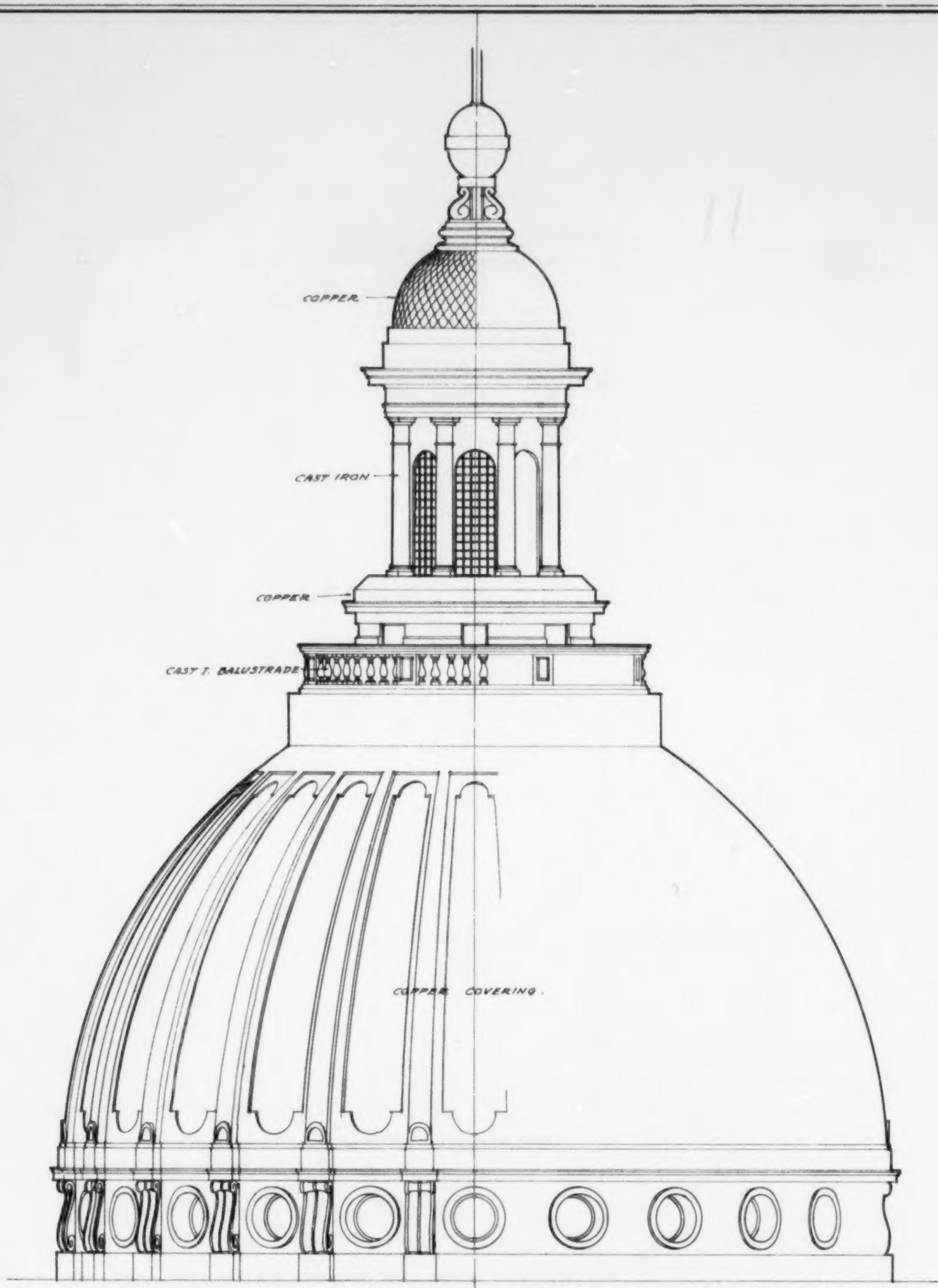
U.S. DEPARTMENT OF THE INTERIOR
OFFICE OF NATIONAL PARKS, BUILDINGS, AND RESERVATIONS
BRANCH OF PLANS AND DESIGN

NAME OF STRUCTURE
# ▾ OLD ST. LOUIS COURT HOUSE ▾
BROADWAY, MARKET, CHESTNUT & FOURTH STREETS. ST. LOUIS, MO.

SURVEY NO. 31-8
APR. 1934

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 8 OF 17 SHEETS

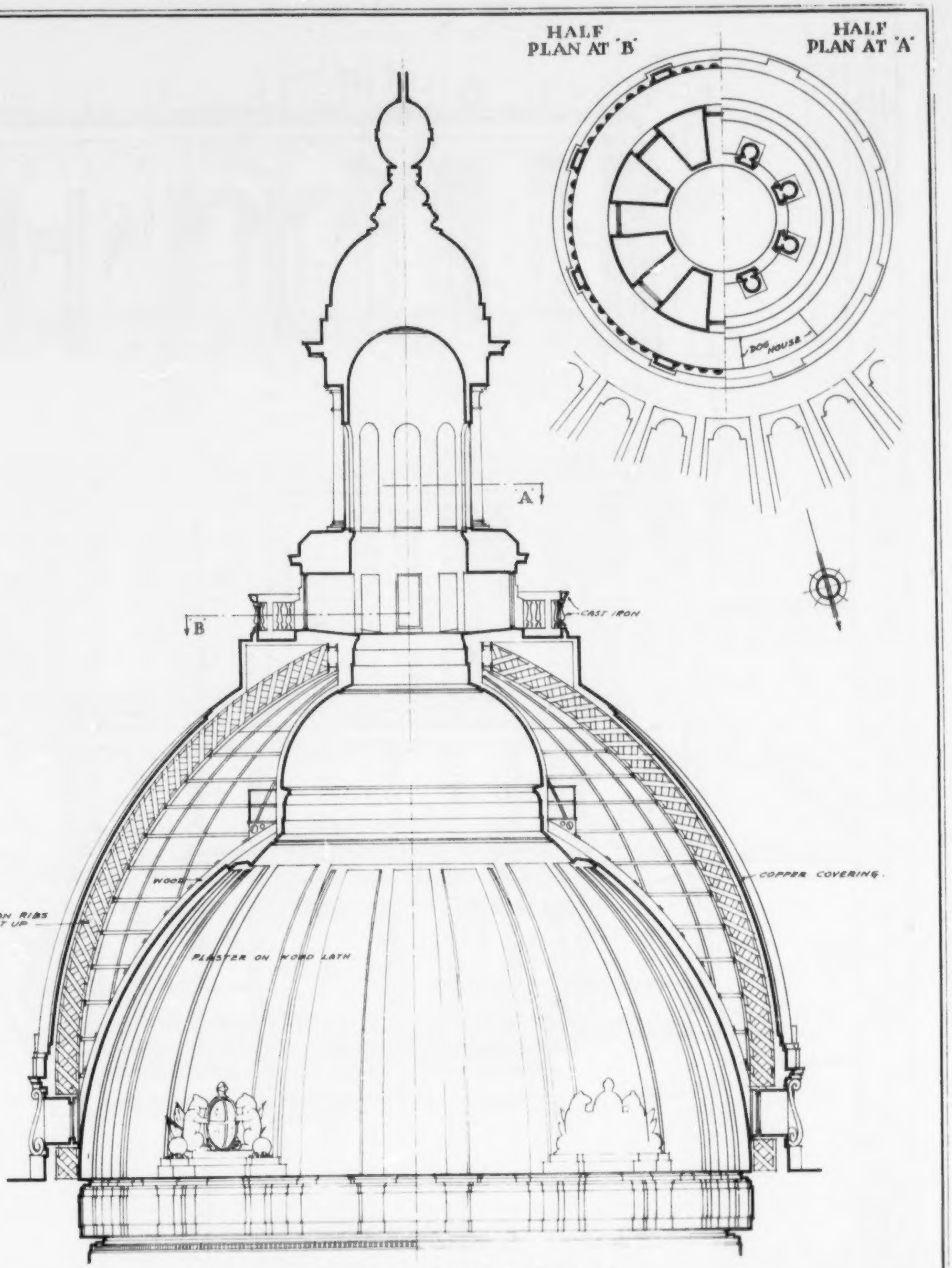
INDEX NO.



ELEVATION OF DOME.

METERS 0 1 2 3 4 5 6
FEET 5 FT 0 5 10 15 20

GEORGE HARKNESS II.
ROBT. M. PRICE.



SECTION THROUGH DOME

GEORGE HARKNESS, III. DEL

U.S. DEPARTMENT OF THE INTERIOR
OFFICE OF NATIONAL PARKS, BUILDINGS, AND RESERVATIONS
BRANCH OF PLANS AND DESIGN

NAME OF STRUCTURE
OLD ST. LOUIS COURT HOUSE – BROADWAY, MARKET, CHESTNUT & FOURTH STREETS, ST. LOUIS, MO.

SURVEY NO.
31-8
APRIL 1934

HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 10 OF 17 SHEETS

INDEX NO.

U.S. DEPARTMENT OF THE INTERIOR
OFFICE OF NATIONAL PARKS, BUILDINGS, AND RESERVATIONS
BRANCH OF PLANS AND DESIGN

NAME OF STRUCTURE
- OLD ST. LOUIS COURT HOUSE - BROADWAY, MARKET, CHESTNUT, & FOURTH STREETS - ST. LOUIS, MO.

SURVEY NO. 31-8. 6-6-1934

HISTORIC AMERICAN BUILDINGS SURVEY
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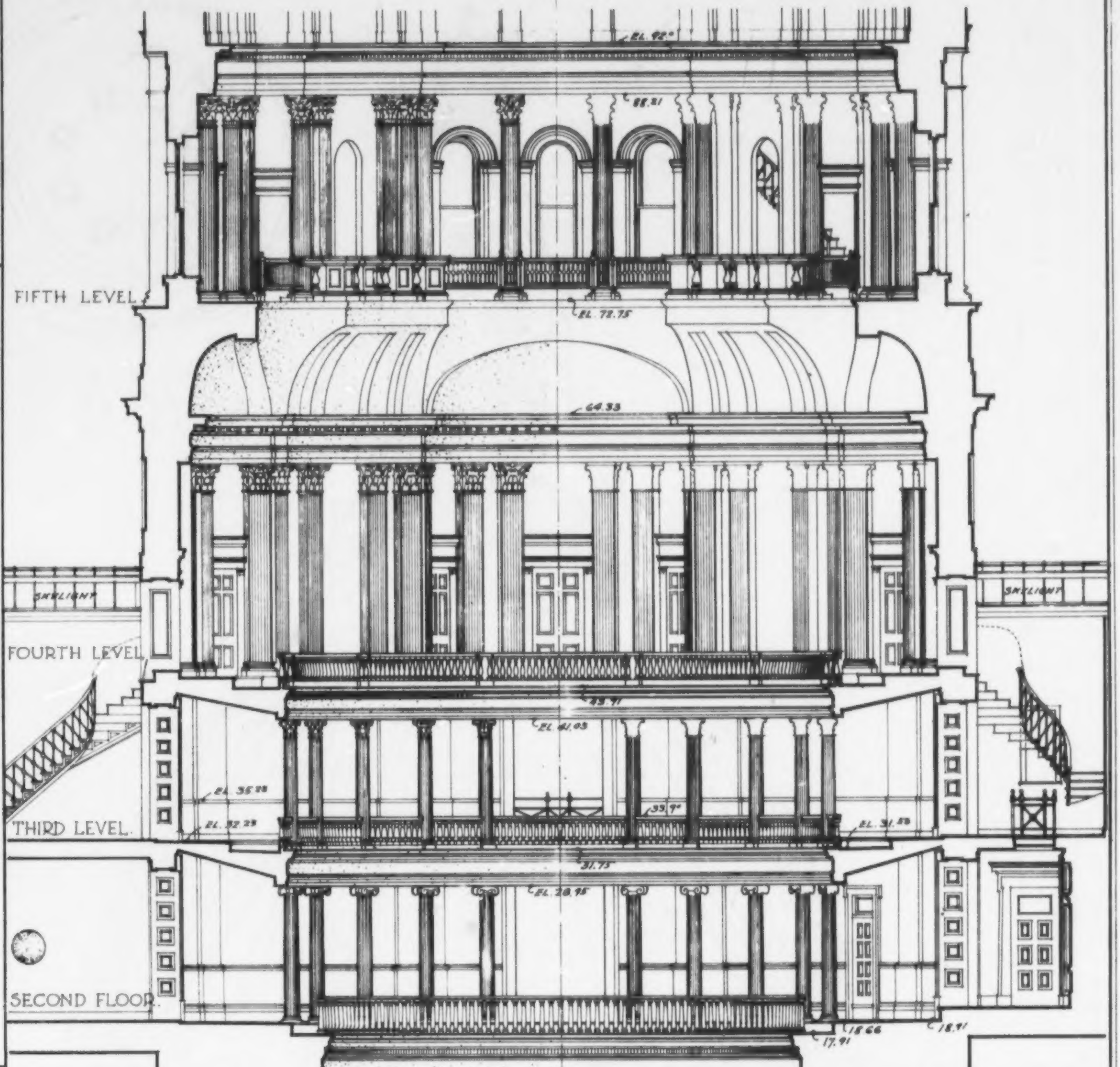
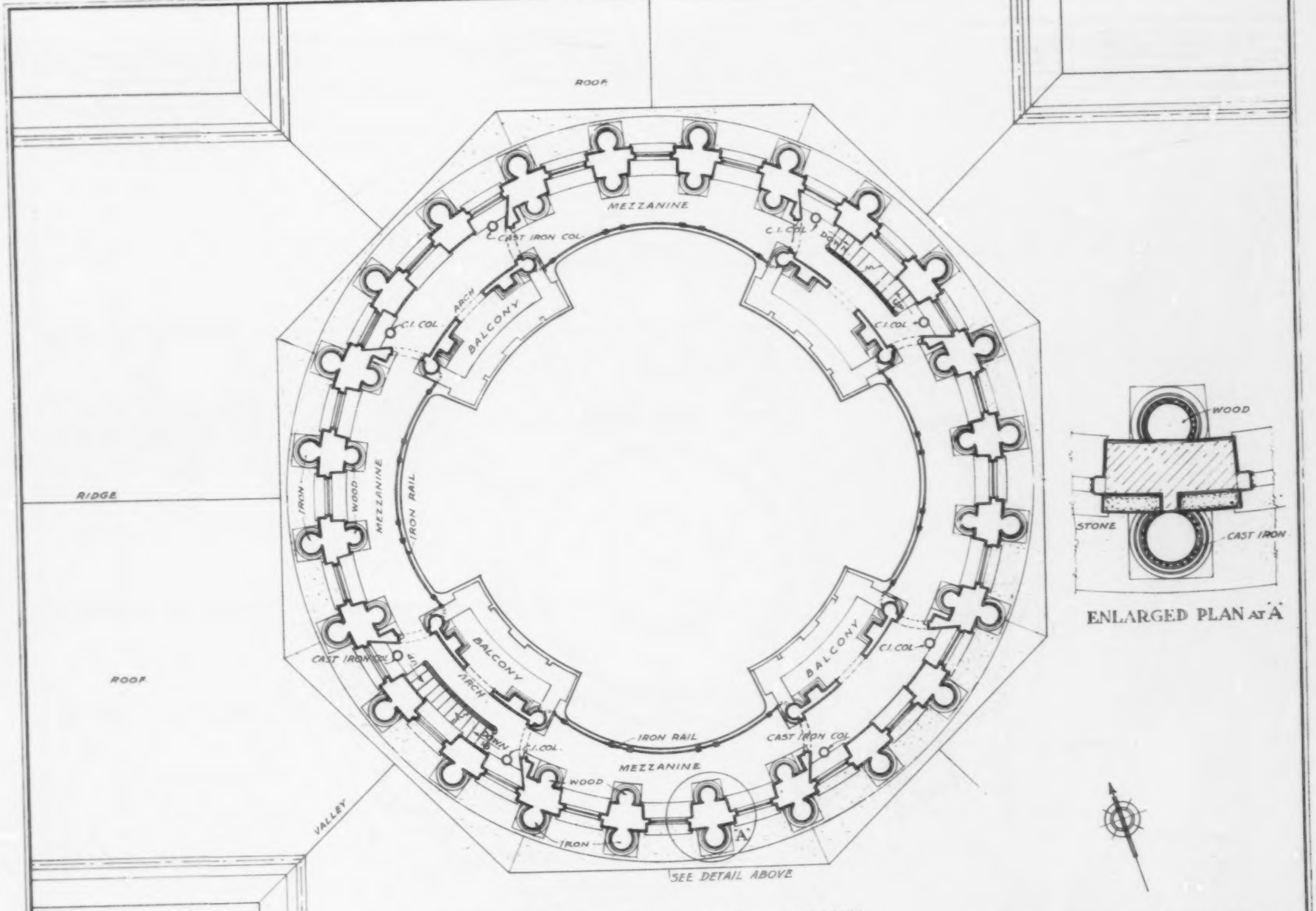


# SECTION THROUGH ROTUNDA

LOOKING SOUTH

GEORGE HARKNESS III.
ROBERT M. PRICE. DELS.

0 1 2 3 4 5 6 METERS
FT. 0 5 10 15 20 FEET.



# PLAN of ROTUNDA - FIFTH LEVEL

DRAWN BY- GEORGE HARKNESS III
RENDERED BY- HARRY G CLYMER

U.S. DEPARTMENT OF THE INTERIOR
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BRANCH OF PLANS AND DESIGN

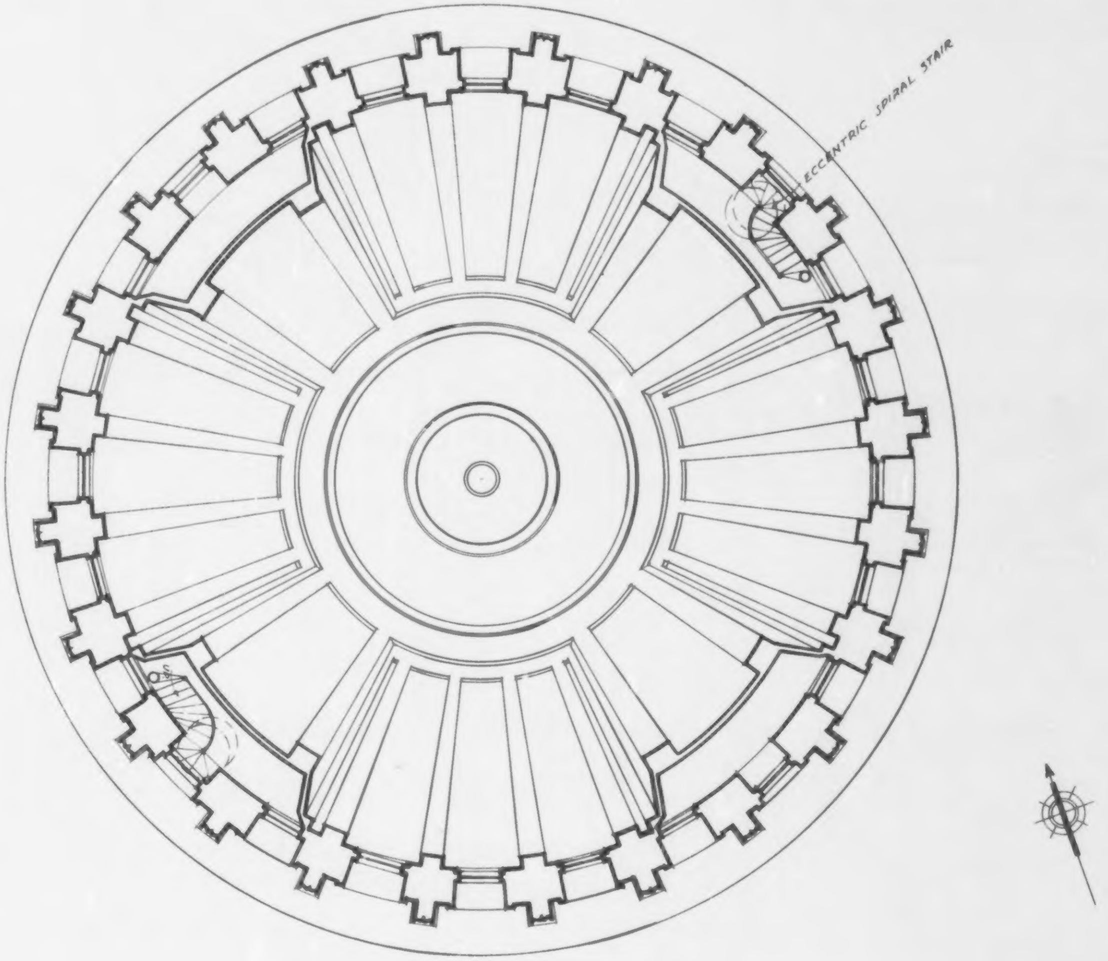
NAME OF STRUCTURE
OLD ST. LOUIS COURT HOUSE.

BROADWAY MARKET, CHESTNUT,
& FOURTH STREETS ST. LOUIS, MO.

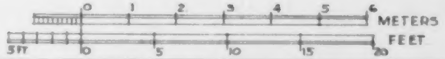
SURVEY NO.
31-8.
APRIL 1934

HISTORIC AMERICAN
BUILDINGS SURVEY
SHEET 6 OF 17 SHEETS

INDEX NO.



REFLECTED PLAN OF DOME.



G. W. AEGERTER . DEL.

U.S. DEPARTMENT OF THE INTERIOR
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BRANCH OF PLANS AND DESIGN

NAME OF STRUCTURE
OLD ST. LOUIS COURT HOUSE.
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SURVEY NO.
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APR. 1934

HISTORIC AMERICAN
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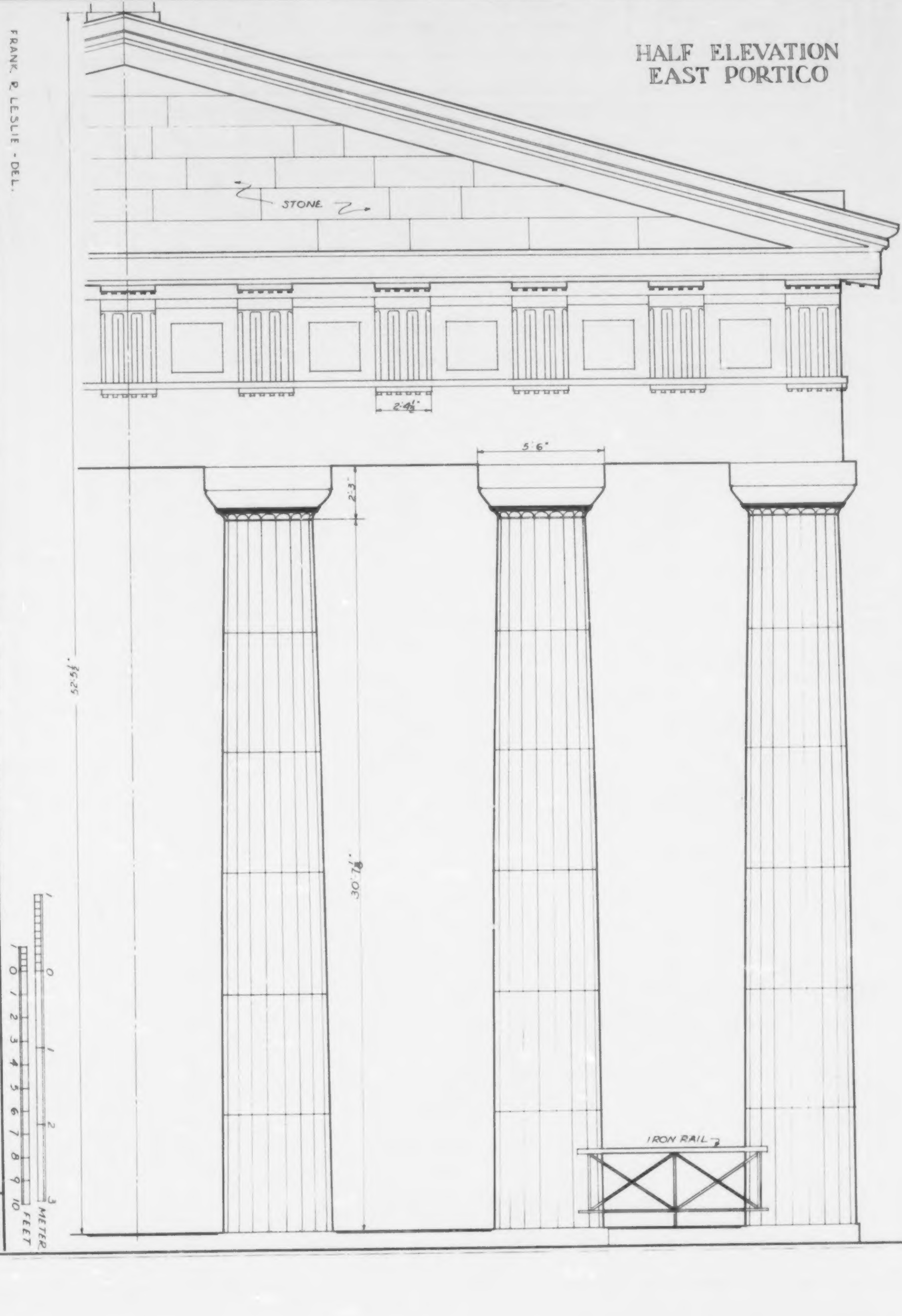
INDEX NO.

# HALF ELEVATION
# EAST PORTICO



FRANK R. LESLIE - DEL.

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UNDER DIRECTION OF UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE, BRANCH OF PLANS AND DESIGN

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HISTORIC AMERICAN BUILDINGS SURVEY
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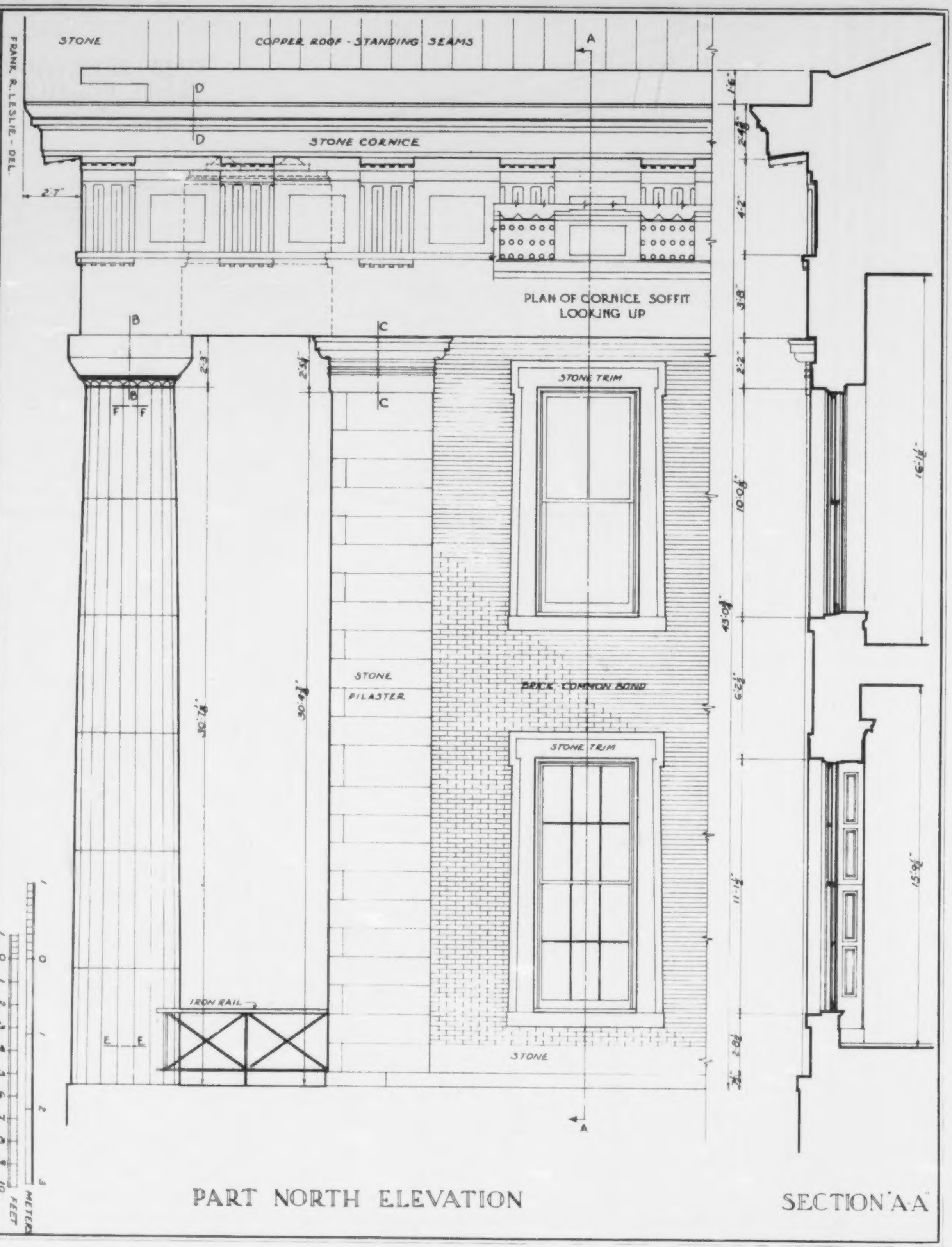
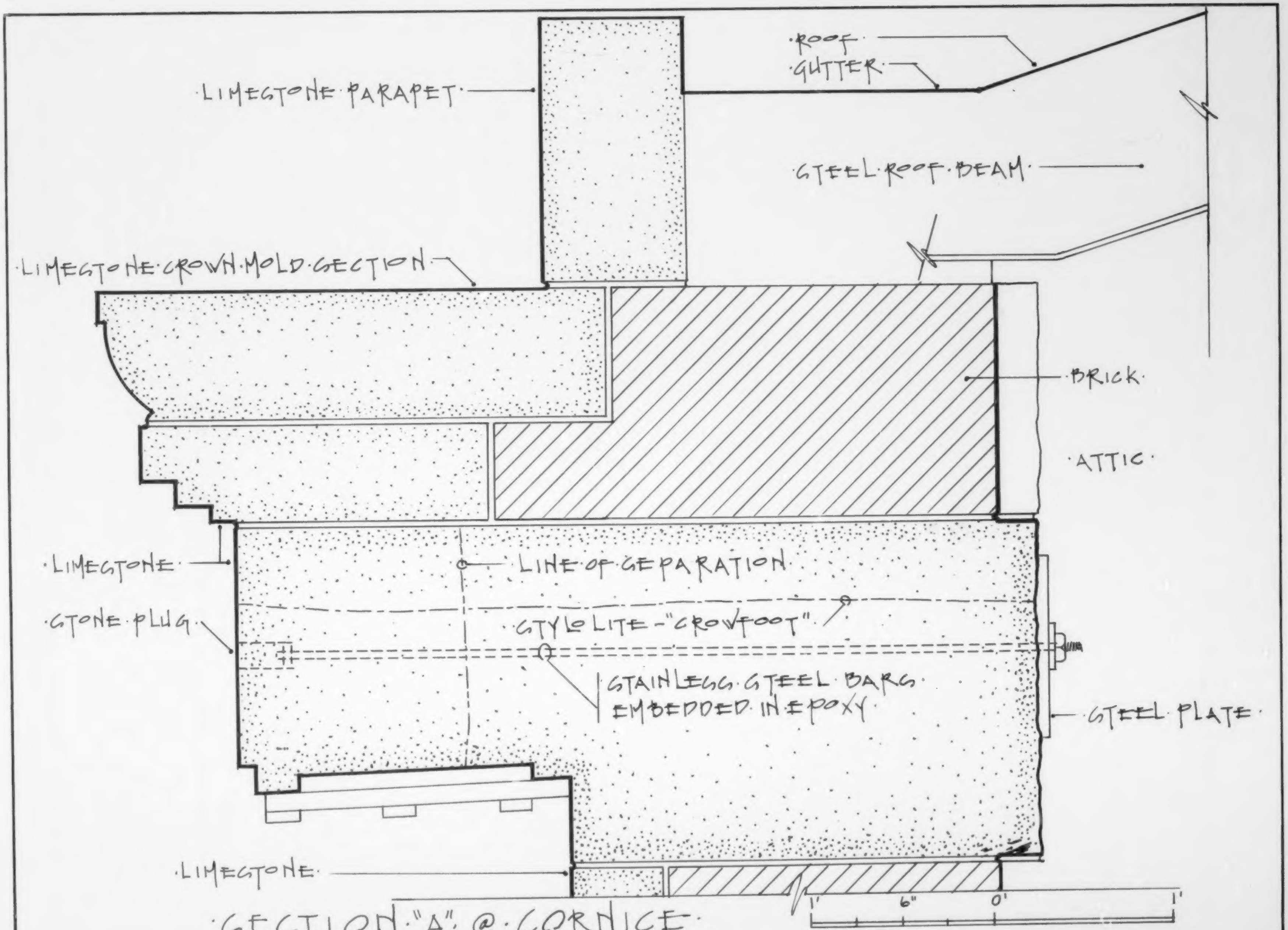
FRANK R. LESLIE - DEL.



PART NORTH ELEVATION

SECTION "A-A"



SECTION "A" @ CORNICE

As the nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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